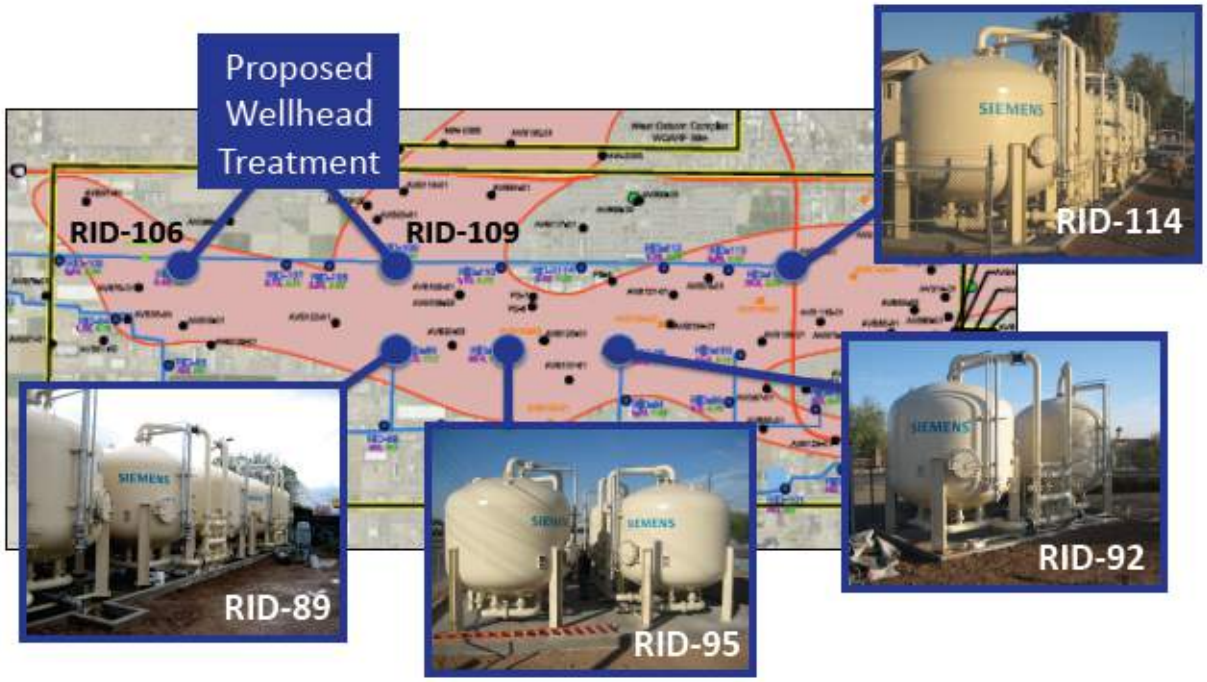
PROPOSED
REMEDIAL ACTION PLAN



JUNE 2015

WEST VAN BUREN AREA WQARF SITE
PHOENIX, ARIZONA

Prepared for: **Arizona Department of Environmental Quality**

On Behalf of: **Roosevelt Irrigation District**

Prepared by: **Synergy Environmental LLC**

SYNERGY ENVIRONMENTAL, LLC

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LIST OF ACRONYMS	
AAC	Arizona Administrative Code
ADEQ	Arizona Department of Environmental Quality
ADHS	Arizona Department of Health Services
ADWR	Arizona Department of Water Resources
AF	acre-feet
AFY	acre-feet per year
ALASG	Air Liquide America Specialty Gases
ALSCo	American Linen Supply Company
APS	Arizona Public Service
ARS	Arizona Revised Statutes
ASR	Aquifer Storage and Recovery
ATSDR	Agency for Toxic Substances and Disease Registry
AWQS	Aquifer Water Quality Standards
bls	below land surface
CAB	community advisory board
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CGTF	Central Groundwater Treatment Facility
CIP	Community Involvement Plan
COC	contaminant of concern
COP	City of Phoenix
COT	City of Tolleson
CREG	Cancer Risk Evaluation Guideline
DCA	dichloroethane
DCE	dichloroethene
DNAPL	dense non-aqueous phase liquid
EPA	U.S. Environmental Protection Agency
ERA	Early Response Action
FS	Feasibility Study
ft/d	feet per day
GAC	granular activated carbon
GPL	Groundwater Protection Level
gpm	gallons per minute
HVOCs	halogenated volatile organic compounds
LAU	lower alluvial unit
LGAC	liquid-phase granular activated carbon
M&A	Montgomery & Associates
M&I	municipal & industrial
M52	Motorola 52nd Street Federal Superfund Site

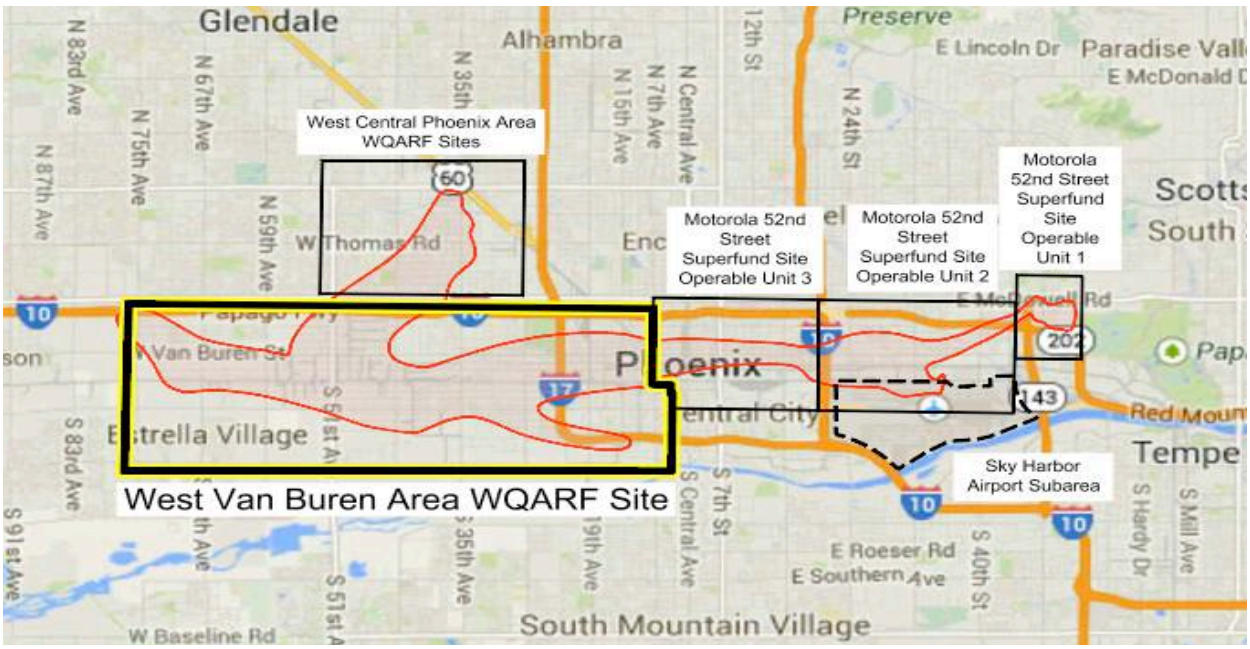
LIST OF ACRONYMS (Cont.)	
MAU	middle alluvial unit
MCL	maximum contaminant level
MCMM	Maricopa County Materials Management
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
OU	Operable Unit
PCE	tetrachloroethene
POS	Prudential Overall Supply
PRAP	Proposed Remedial Action Plan
PRP	potentially responsible party
RI	Remedial Investigation
RID	Roosevelt Irrigation District
RO	Remedial Objective
ROD	Record of Decision
RSL	Regional Screening Level
SHA	Sky Harbor International Airport
SRL	Soil Remediation Level
SRP	Salt River Project
SRV	Salt River Valley
SSL	soil screening level
SVE	soil vapor extraction
SWQS	surface water quality standards
TCA	trichloroethane
TCE	trichloroethene
UAU	upper alluvial unit
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
$\mu g/m^3$	micrograms per cubic meter
UIC	United Industrial Corporation
UNOCAL	Union Oil Company of California
UDOE	United States Department of Energy
VBTF	Van Buren Tank Farm
VOC	volatile organic compound
WCP	West Central Phoenix
WOC	West Osborn Complex
WQARF	Water Quality Assurance Revolving Fund
WVBA	West Van Buren Area
WVBG	West Van Buren Group
WVBSA	West Van Buren Study Area
VW&R	Van Waters & Rogers

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EXECUTIVE SUMMARY

Roosevelt Irrigation District (RID) has prepared this *Proposed Remedial Action Plan* (*PRAP)*, pursuant to Arizona Administrative Code (AAC) R18-16-408 and in accordance with the terms of the *Agreement to Conduct Work* between ADEQ and RID, to select a remedy to address regional groundwater contamination impacting the West Van Buren Area (WVBA) Water Quality Assurance Revolving Fund (WQARF) Site in Phoenix, Arizona, consistent with the proposed regional groundwater remedy in the ADEQ-approved RID FS Report. This *PRAP* is based on the analysis and findings documented in the *Revised Draft Feasibility Study Report*, submitted by RID to ADEQ on November 26, 2014 (the "*RID FS Report"*). Following detailed review, ADEQ determined that the *RID FS Report* meets the requirements of Arizona Revised Statutes (ARS) 49-287.03 and AAC R18-16-407 and approved the *RID FS Report* on April 13, 2015. The *RID FS Report* was prepared following completion of the final *Remedial Investigation Report* that was issued by ADEQ in August 2012 (the *"Final WVBA RI Report")*.

The *Final WVBA RI Report* indicates that groundwater in the WVBA WQARF Site contains significant concentrations of hazardous chlorinated volatile organic compounds (VOCs) that are widely distributed throughout the WVBA WQARF Site. Site investigations conducted over the past 25 years at over 50 industrial and commercial facilities in the WVBA WQARF Site have identified numerous source areas that released VOC contaminants and contributed to area-wide groundwater contamination. Moreover, groundwater contamination in the WVBA WQARF Site is part of a larger commingled plume of VOC contaminants that encompasses the adjacent Motorola 52nd Street federal Superfund Site to the east, the Sky Harbor International Airport Site to the southeast, and the West Central Phoenix Area WQARF sites to the north, as shown below.



Collectively, the commingled VOC groundwater plume extends nearly 15 miles throughout central Phoenix from 52nd Street to beyond 75th Avenue and is by far the largest combined groundwater contaminant plume in Arizona and one of the single largest VOC plumes in the country.

The commingled plumes of VOC-contaminated groundwater in the adjacent sites flow toward and enter the WVBA WQARF Site in response to large-scale pumping of RID water supply wells within the WVBA. VOC contaminants in groundwater from these adjacent sites, along with VOC releases within the WVBA Site, have impacted 24 RID wells with detectable concentrations of one or more hazardous VOCs, while 13 of these wells exceed applicable VOC aquifer water quality standards (AWQSs) and maximum contaminant levels (MCLs). In recent years the 33 RID wells in the WVBA vicinity have pumped an average of 83,500 acre-feet of groundwater, and extracted an estimated 2,900 pounds of VOCs annually. Without treatment, the contaminated groundwater pumped by RID discharges to a surface conveyance system where VOCs in the water are known to volatilize and transfer hazardous VOC air pollutants[1] from groundwater to air.

The *RID FS Report* evaluated four (4) possible groundwater alternative remedies as a potential regional groundwater remedy for the WVBA Site in accordance with the applicable requirements in ARS § 49-282.06 and AAC R18-16-407. By law and rule, all possible groundwater alternative remedies must be capable of achieving all of the Remedial Objectives (ROs) for water use within the WVBA WQARF Site and need to be consistent with general land use and water management plans.[2] Although RID currently is the only WVBA water provider whose existing water supply wells and reasonably foreseeable water end use as a drinking water supply are adversely impacted or immediately threatened by the widespread VOC groundwater plume in the WVBA WQARF Site, other water providers such as Arizona Public Service, Salt River Project, and the cities of Phoenix and Tolleson have water supply wells in the WVBA vicinity that are potentially threatened and must be considered in the regional groundwater remedy selected by ADEQ for the WVBA WQARF Site.[3] Because the focus of the *PRAP* is on a regional groundwater remedy, response actions conducted by private parties or ADEQ to address facility-specific sources of VOC releases or hot spots within the WVBA WQARF Site are not included in the scope of this *PRAP*.

This *PRAP* summarizes the major findings of the *RID FS Report*. Four (4) groundwater alternative remedies were evaluated as a potential regional groundwater remedy for the WVBA WQARF Site, and in simplest terms, the main elements consist of:

[1] *See* 42 United States Code (USC) § 7412.b.
[2] *See* ARS § 49-287.03.F and AAC R18-16-407.E.1 and G.
[3] *See* ARS §§ 49-282.06.A and 49-282.06.B.4.b.

Reference Remedy – Installing wellhead treatment at nine (9) existing impacted wells and blending of four (4) other impacted wells that would be operated to achieve both applicable AWQSs and MCL water quality for all current and reasonably foreseeable water end uses at all wells of the existing water providers within or adjacent to the WVBA WQARF Site. Two (2) replacement wells would be drilled to enhance hydraulic capture in critical areas of plume containment and to restore any reduction in the available supply of water caused by addressing impacted wells.

Less Aggressive Groundwater Alternative Remedy – Reducing the scale of the Reference Remedy by installing wellhead treatment at six (6) existing impacted wells and blending of six (6) other impacted wells to achieve both applicable AWQSs and MCL water quality for all current and reasonably foreseeable water end uses at all wells of the existing water providers within or adjacent to the WVBA WQARF Site. Only one (1) replacement well would be drilled to address and achieve both applicable AWQSs and MCL water quality for all current and reasonably foreseeable water end uses, as well as to enhance hydraulic capture and plume containment at the leading edge of the WVBA plume and to restore any reduction in the available supply of water caused by addressing impacted wells.

More Aggressive Groundwater Alternative Remedy – All elements of the Less Aggressive Remedy plus proposed modifications at five (5) wells in peripheral areas most threatened by the WVBA WQARF Site plume to reconfigure the wells for injection of underutilized effluent that is available during low irrigation demand periods.

Most Aggressive Groundwater Alternative Remedy – Installing wellhead treatment at all 13 existing impacted wells that exceed AWQSs and MCLs for the VOC groundwater contaminants.

Based on the results of detailed analysis set forth in the *RID FS Report* and summarized in this *PRAP*, the Less Aggressive groundwater alternative remedy is the proposed regional groundwater remedy for the WVBA Site. This groundwater alternative remedy is reasonable, necessary, cost-effective and technically feasible and decisively considered the most readily implementable and cost beneficial approach that satisfies all of the applicable remedial action criteria in ARS § 49-282.06.A. and ARS § 49-282.06.B.4.b., including cleaning up waters of the state for their "maximum beneficial use" and addressing all existing wells within and adjacent to the WVBA WQARF Site that may not be fit for their "current or reasonably foreseeable end uses" without treatment. This groundwater remedy also meets all of the groundwater ROs for the WVBA WQARF Site, including the restoration of the impacted groundwater for its current or reasonably foreseeable end use as a source of drinking water, while ensuring protection of other water provider wells that are peripheral to and downgradient from the VOC plume, and reducing the risk of hazardous VOCs being transferred to surrounding communities.

The Less Aggressive regional groundwater alternative remedy would require implementation of the following remedial measures, in addition to the four (4) existing wellhead treatment systems that were installed to address certain highly impacted wells within the WVBA WQARF Site as part of a wellhead treatment system pilot initiative which was approved by ADEQ as being necessary, reasonable and cost-effective in the Modified Early Response Action:

- Wellhead treatment using liquid phase granular activate carbon at two (2) additional existing impacted water supply wells;
- Installation of a higher capacity replacement well, completed solely in the contaminated aquifer, to address and achieve both applicable AWQSs and MCLs for the target COCs at RID well 106, as well as to enhance hydraulic capture at the leading edge of the plume and to restore any reduction in the available supply of water caused by addressing impacted wells;
- Priority pumping of all impacted wells equipped with treatment to enhance mass removal and plume containment to achieve applicable AWQSs for the target COCs and to enable blending of other impacted wells to achieve necessary MCL water quality for all current and reasonably foreseeable end uses of the groundwater as a source of drinking water by all existing water providers at all wells within and adjacent to the WVBA WQARF Site;
- Engineering controls to limit potential routes of public exposure to COCs within the RID water delivery system; and
- Groundwater monitoring to verify plume containment and assess the progress towards groundwater remediation.

The estimated capital cost of the Less Aggressive regional groundwater alternative remedy is $9.4 million for all remedial measures (including those already implemented), and annual operation and maintenance costs are projected to be $2.0 million. Pursuant to AAC R18-16-411.G, RID is fully committed to implement and operate the regional groundwater remedy proposed in this *PRAP*, in working partnership with ADEQ, to address VOC groundwater contamination to achieve applicable AWQSs for the target COCs, to achieve MCL water quality to protect the current and reasonably foreseeable water end uses of all existing well owners at all wells within and adjacent to the WVBA WQARF Site (including RID and other water provider wells) and to mitigate environmental concerns at the largest groundwater contaminant plume in Arizona.

1.0 INTRODUCTION

Synergy Environmental, LLC (Synergy) has developed this *Proposed Remedial Action Plan* (PRAP) for submittal to the Arizona Department of Environmental Quality (ADEQ) for the West Van Buren Area (WVBA) Water Quality Assurance Revolving Fund (WQARF) Site, located in Phoenix, Arizona (see Figure 1). The widespread plume associated with the WVBA WQARF Site is the result of contamination sources within the WVBA as well as sources of contamination originating from the east, from the Motorola 52nd Street federal Superfund Site (M52 Site), as well as from the north, from the West Osborn Complex (WOC) WQARF Site.

Under Arizona Revised Statute (ARS) § 49-287.04, a PRAP must be prepared for the proposed remedy of the WVBA contaminated groundwater plume for public review and comment. Pursuant to Arizona Administrative Code (AAC) R18-16-408, "following the completion of the feasibility study report under R18-16-407(I), the Department or any person shall prepare a proposed remedial action plan" and any person "may submit a proposed remedial action plan to the Department for approval under R18-16-413." This section provides information regarding the purpose and organization of this *PRAP*.

1.1 PURPOSE OF DOCUMENT

This *PRAP* is submitted on behalf of the Roosevelt Irrigation District (RID) to ADEQ pursuant to AAC R18-16-408 and in accordance with the terms of the *Agreement to Conduct Work* between ADEQ and RID dated October 8, 2009 (ADEQ, 2009), as Amended February 27, 2014 (ADEQ, 2014a),[4] and consistent with the proposed regional groundwater remedy and findings documented in the *Revised Draft Feasibility Study Report*, submitted by RID to ADEQ on November 26, 2014 (hereafter referred to as the *RID FS Report*; Synergy, 2014b). The *RID FS Report* was approved by ADEQ on April 13, 2015 for "meet[ing] the requirements of Arizona Revised Statutes 49-287.03 and Arizona Administrative Code R18-16-407" (ADEQ, 2015). The RID FS Report was prepared following completion of the final *Remedial Investigation Report* (Terranext, 2012) for the WVBA WQARF Site (hereafter referred to as the *Final WVBA RI Report*) that was issued by ADEQ in August 2012. The information contained in the *PRAP* is drawn from and, in many cases, quotes directly from the above-referenced remedial investigation (RI) and feasibility study (FS) reports without attribution other than as noted here.

The purpose of the *PRAP* is to inform the public on the proposed regional groundwater remedy selected from the alternatives evaluation in the *RID FS Report*, pursuant to AAC R18-16-407(I), to address the contaminants of concern (COCs) in groundwater within the WVBA WQARF Site and satisfy the statutory requirements in ARS § 49-282.06 and all the site-specific remedial objectives (ROs) established by ADEQ for the WVBA WQARF Site.

[4] ADEQ confirmed in writing that RID's submittal of this PRAP is within the scope of the existing written working agreement between RID and ADEQ, *see* electronic mail from Ms. Laura Malone to Mr. David Kimball dated June 22, 2015.

The PRAP is part of the regional groundwater remedy selection process under WQARF where public input is solicited on all alternatives and on the rationale for the proposed regional groundwater remedy. Therefore, the public is encouraged to review and comment on this *PRAP*.

1.2 REPORT ORGANIZATION

This *PRAP* has been organized into the following sections:

Section 1 - Introduction
Section 2 - Site Background
Section 3 - Site Characterization
Section 4 - PRAP Scoping
Section 5 - Need for Remedial Action
Section 6 - Summary of Remedial Strategies and Measures
Section 7 - Summary of Groundwater Remedies Evaluated in RID FS Report
Section 8 - Evaluation of Proposed Remedies in RID FS Report
Section 9 - Proposed Remedy
Section 10 - Community Participation
Section 11 - References

2.0 SITE DESCRIPTION

This section presents a summary description of the WVBA WQARF Site, the volatile organic compounds (VOCs) that are COCs at the Site, Site registry and remedial investigation activities conducted within the Site, chronology of Site activities by ADEQ, and the early response actions conducted to date.

2.1 BOUNDARIES OF WVBA WQARF SITE AND REGIONAL GROUNDWATER CONTAMINATION

The WVBA WQARF Site, originally called the Van Buren Tank Farm Study Area, was placed on the WQARF Registry as a priority site in November 1987. Since 1988, ADEQ and various parties have conducted investigations of contaminated soil and groundwater within the WVBA WQARF Site through a protracted, 20-year RI process.

According to the *Final WVBA RI Report*, the WVBA WQARF Site extends from approximately 7th Avenue west to beyond 75th Avenue, and from Buckeye Road north to Interstate 10. This corresponds to an area approximately eight miles in length and 1.5 miles in width (i.e., approximately 12 square miles), see **Figure 1**. In addition, a finger shaped plume exists approximately between 7th and 27th Avenues between Buckeye and Lower Buckeye Roads.

The entire WVBA WQARF Site is located within the City of Phoenix (COP), although the western margin along 75th Avenue abuts the City of Tolleson (COT). Land within the WVBA WQARF Site is used for a combination of residential, commercial, industrial and agricultural purposes. According to the *Final RO Report* (ADEQ, 2012a), the Estrella Village, which is referenced as one (1) of 15 "urban villages" that comprise the COP and one (1) of two (2) "urban villages" within the WVBA WQARF Site, is a targeted growth area that is expected to experience significant increases in both employment and residential growth. Further information concerning site demography is available in the *Final WVBA RI Report* and *Final RO Report*.

The WVBA WQARF Site also is part of a larger region of groundwater contamination that encompasses the adjacent Motorola 52nd Street federal Superfund[5] site (M52 Site) to the east, the Sky Harbor Area Site (SHA Site) to the southeast, and the West Central Phoenix Area WQARF sites (WCP sites) to the north, as shown in **Figure 2**. Prior to submittal of the *RID FS Report*, the regional extent of groundwater contamination had not been mapped and addressed in an integrated manner. The depicted regional groundwater contaminant plume in **Figure 2** is an extrapolation of commingled groundwater contaminant plumes from multiple

[5] The Federal Superfund program was promulgated under CERCLA and is administered by the Environmental Protection Agency.

sources throughout the four (4) regional sites.[6] As noted in stakeholder comments on the Draft *WVBA RI Report*, "the concept of the 'WVBA groundwater plume' is a simplification of the distribution of contaminants in groundwater in the WVSA [sic]. In reality, the WVBSA [West Van Buren Study Area] has a combination of many, commingled plumes with different sources, different timing, different VOCs and differing fate and transport parameters. In addition, a significant portion of the groundwater contamination of the WVBA appears to be related to contamination entering the Site from the east."[7]

2.2 CONTAMINANTS OF CONCERN

Volatile Organic Compounds

The VOCs that are COCs at the WVBA WQARF Site have been identified based on historical and present data obtained from samples collected by ADEQ.[8] These COCs comprise the commingled WVBA WQARF Site plume and are listed as follows, including the chemical name and the Chemical Abstract Service (CAS) number:

- 1,1-Dichloroethene (1,1-DCE) CAS number 75-53-4
- Tetrachloroethene (PCE) CAS number 127-18-4
- Trichloroethene (TCE) CAS number 79-01-6
- 1,1,1-Trichloroethane (TCA) CAS number 71-55-6
- cis-1,2-Dichloroethene (cis-1,2-DCE) CAS number 156-59-2
- 1,1-Dichloroethane (1,1-DCA) CAS number 75-34-3

Table 1 presents a summary of analytical results for groundwater samples collected at WVBA WQARF Site monitor wells by ADEQ during March 2013 (Terranext, 2013). **Table 2** presents a summary of analytical results for PCE, TCE, and 1,1-DCE found in groundwater samples collected at RID water supply wells by ADEQ during 2003 through 2014.[9] These three (3) COCs are the principal VOC contaminants in WVBA groundwater and are referred to as "target COCs" throughout this report.[10]

[6] In this and subsequent maps, the SHA Site is not shown. Rather, as will be discussed in section 3.2.2, the SHA subarea will be treated as part of Operable Unit 2 (OU2) of the M52 Site.
[7] Letter from Univar to ADEQ regarding *Univar USA Inc.'s Comments, Draft Remedial Investigation Report, West Van Buren Area WQARF Site, Phoenix, AZ*, dated December 29, 2008 (Univar, 2008).
[8] Terranext (2012) indicated 1,4-dioxane is a notable COC for OU3. To evaluate the occurrence of this potential COC in the WVBA, RID sampled and analyzed the four (4) RID wells having the highest VOC concentrations for 1,4-dioxane in March 2015. The data indicate 1,4-dioxane was present at concentrations of 0.60 µg/L at RID-114, 0.84 µg/L at RID-92, 0.99 µg/L at RID-89, and 1.2 µg/L at RID-95.
[9] With RID's assistance, ADEQ sampled RID wells in the WVBA WQARF Site for VOC contaminants in March 2015. The data from this sampling event are not available at the time of this *PRAP*. Split sampling conducted by RID at RID wells 89, 92, 95, 106, 109, and 114 indicates that VOC concentrations are comparable to results obtained in March 2014.
[10] Although all three (3) target COCs occur in concentrations exceeding AWQSs and MCLs, this *PRAP*, consistent

Chromium

Chromium, to a limited extent, also is considered a COC that occurs locally within the WVBA WQARF Site boundaries. During the March 2013 sampling round (Terranext, 2013), analytical results for 11 out of 50 WVBA monitor wells indicated concentrations of total chromium greater than the applicable numeric aquifer water quality standard (AWQS) and maximum contaminant level (MCL) of 0.1 milligrams per liter (mg/L)[11] with the highest concentration detected at 5.74 mg/L and the lowest concentration detected at 0.11 mg/L (**Table 1**). During March 2014, ADEQ sampled 28 of the 33 RID water supply wells located within or adjacent to the WVBA WQARF Site for chromium, and analytical results provided in **Table 3** indicate that the highest total chromium concentration detected was less than half of the applicable numeric AWQS and MCL.[12]

The *Final WVBA RI Report* indicated that chromium is limited in occurrence and can only be clearly attributed to one known source area in the southeast portion of the WVBA WQARF Site. Additionally, the *Final WVBA RI Report* noted that ADEQ believes the chromium detected in monitor wells may be due to deterioration of stainless steel well casing, where present, or naturally occurring in subsurface soils. Due to the limited and localized occurrence of chromium, the uncertainty regarding sources of chromium in groundwater within the WVBA WQARF Site, and the fact that there are no existing wells within or adjacent to the WVBA Site (including RID, SRP, COP, APS and COT wells) that exceed the applicable numeric AWQS or MCL, chromium will not be further evaluated or addressed in this regional groundwater *PRAP*, which is consistent with the scope of chromium evaluation under the *RID FS Report*.[13]

Extent of Volatile Organic Compounds in Groundwater

Water quality data obtained in recent years at WVBA WQARF Site monitor wells, RID water supply wells, and shallow groundwater monitor wells in the WCP sites (principally the WOC WQARF Site) are shown on the plume map depicted in **Figure 2**. This map represents the estimated regional extent of TCE and PCE contamination in UAU groundwater that is greater than the applicable numeric AWQS and MCL of 5.0 micrograms per liter (µg/L) in the commingled plume.[14] Additionally, this figure identifies the projected extent of groundwater

with the *RID FS Report*, primarily focuses on PCE and TCE since these compounds are more prevalent, have higher concentrations, and are considered a greater health risk than 1,1-DCE.

[11] *See* 40 CFR 141.62 and AAC R18-11-406.

[12] The current numeric AWQS and primary MCL drinking water standard are for total chromium. These samples also were analyzed for hexavalent chromium with the understanding that EPA likely will develop a primary drinking water standard applicable to this species of chromium. Of the 28 RID wells tested for hexavalent chromium, 10 RID wells had concentrations above the method reporting limit of 5 µg/L. The observed hexavalent chromium concentrations are all below 15 µg/L, with the exception of well RID-99 at 43 µg/L.

[13] Although the *PRA*P, consistent with the *RID FS Report*, does not address chromium contamination as part of the regional groundwater remedy, it may be necessary to reevaluate requirements for remedial actions in the WVBA WQARF Site if EPA and/or ADEQ should adopt a MCL or AWQS for hexavalent chromium at or below 10 µg/L.

[14] The primary MCL of five (5) µg/L for TCE and PCE was established by EPA under the federal Safe Drinking

contamination in the M52 Site based on mapping of the plume by ADEQ.

Given that there are multiple COCs in groundwater originating from various, widespread sources identified in four (4) different regional areas under different agency oversight, the depiction of a regional plume throughout this area is, by its very nature, a generalized representation. Furthermore, the data available to characterize the extent of groundwater contamination derives from diverse well completions ranging from monitoring wells having limited, depth-discrete sampling intervals to large capacity RID water supply wells that may yield groundwater from perforated casing over many hundreds of feet within the aquifer(s). Consequently, well data do not always appear consistent and are interpreted with greater significance attached to water supply well data, since this provides more representative characterization of bulk conditions of the producing aquifer.

Regional Extent of Volatile Organic Compounds in Groundwater

Three (3) target COCs (TCE, PCE and 1,1-DCE) are present in groundwater within the WVBA WQARF Site at concentrations that exceed the applicable numeric and narrative AWQSs[15] and MCLs.[16] The numeric AWQSs, MCLs and MCL Goals[17] for the target COCs are:

- TCE = 5.0 μg/L (AWQS/MCL) and 0 μg/L (MCL Goal)
- PCE = 5.0 μg/L (AWQS/MCL) and 0 μg/L (MCL Goal)
- 1,1-DCE = 7.0 μg/L (AWQS/MCL) and 7.0 μg/L (MCL Goal)

Aside from the primary MCL drinking water quality standards, which were applicable prior to the WQARF Program, various other regulatory standards and thresholds are listed for the target COCs in the *Final WVBA RI Report*, including: human Health-Based Guidance Levels (HBGLs) implemented by ADEQ in 1992, Soil Remediation Levels (SRLs) implemented by ADEQ in December 1997 and revised in May 2007, Groundwater Protection Levels (GPLs) implemented by ADEQ in September 1996, EPA MCLs promulgated in 1987, and Arizona numeric and narrative AWQSs implemented by ADEQ in January 1990.

Water Act and has been adopted as applicable Arizona drinking water quality MCLs and numeric AWQSs. *See* 40 Code of Federal Regulations (CFR) 141.61, AAC R18-11-406 and ARS §§ 49-223A and 49-224.B.

[15] Arizona has established enforceable numeric AWQSs based upon EPA's primary drinking water MCL standards because all aquifers in Arizona are classified for drinking water protected use. *See* ARS § 49-224.B., ARS § 49-223.A., and AAC R18-11-406. In addition to the enforceable numeric AWQSs, Arizona has established the following enforceable narrative AWQSs: a discharge shall not cause a pollutant to be present in an aquifer classified for a drinking water protected use in a concentration which endangers human health; a discharge shall not cause or contribute to a violation of a water quality standard established for a navigable water of the state; and a discharge shall not cause a pollutant to be present in an aquifer which impairs existing or reasonably foreseeable uses of water in an aquifer. *See* ARS § 49-221.D. and AAC R18-11-405.

[16] EPA has established primary MCLs as enforceable drinking water standards determined by balancing the adverse health effects of a particular chemical against the feasibility and cost of treating contaminated water. Arizona has adopted EPA's primary MCLs as enforceable state drinking water quality standards. *See* AAC R18-4-104.

[17] EPA has established a MCL Goal as non-enforceable health-based guidelines, which have been traditionally set to zero (0) for potential human carcinogens.

More recently, EPA developed risk-based screening levels applicable to CERCLA hazardous substances, including WVBA WQARF Site target COCs, for potential public exposure to these contaminants in water, soil, and air. In 2009, EPA harmonized the screening levels from Regions 3, 6, and 9 into a single table to derive Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites. The RSLs[18] were developed, and are periodically updated, using risk assessment guidance from the EPA Superfund program. RSLs are derived from standardized equations combining exposure information assumptions with current EPA toxicity data.[19] A summary of the RSLs[20] for the WVBA WQARF Site target COCs is included in the following table:

EPA Regional Screening Level Summary Table[21]

Analyte	Screening Levels						Protection of Groundwater SSLs	
	Residential Soil (mg/kg)	Industrial Soil (mg/kg)	Residential Air (µg/m^3)	Industrial Air (µg/m^3)	Tapwater (µg/L)	MCL (µg/L)	Risk-Based SSL (µg/kg)	MCL-Based SSL (µg/kg)
1,1-DCE	230	1,000	210	880	280	7.0	100	2.5
PCE	24	100	11	47	11	5.0	5.1	2.4
TCE	0.94	6.0	0.48	3.0	0.49	5.0	0.18	1.8

[18] *See* EPA user guide: http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/usersguide.htm

[19] On February 10, 2012, EPA issued new toxicity information for PCE. This publication followed the release of new toxicity factors on September 28, 2011 for TCE. EPA's recent review lowered the carcinogenic values previously used as screening levels for TCE (i.e., TCE is now considered a more potent carcinogen). The new toxicity criteria led EPA to adjust the RSLs it uses for evaluating environmental data for TCE in November 2011. However, unlike TCE, the cancer RSLs for PCE have actually increased (are less conservative) by about 20 times. *See* EPA updates located online at http://www.epa.gov/reg3hscd/risk/human/rb-concentration_table/whatsnew.htm (last visited on 5/13/2014) and http://www.epa.gov/region9/superfund/prg/rsl-table.html (last visited 5/4/2012). From a drinking water quality perspective, the new toxicity data are impacting EPA's review of its MCLs for both chemicals. The MCL for TCE is expected to decrease, perhaps by a factor of up to 10, because it is considered to be carcinogenic by all routes of exposure (EPA's highest carcinogenicity classification), while the MCL for PCE is expected to increase. EPA proposed MCL revisions for both chemicals could be revised in the next five (5) years. This new toxicity information for PCE and TCE also may become relevant under ADEQ's narrative AWQSs, which prohibit pollutants to be present in an aquifer classified for a drinking water protected use in a concentration which endangers human health or which impairs existing or reasonably foreseeable uses of water in an aquifer. *See* AAC R18-11-405 and ARS § 49-221.

[20] Current soil data are not indicative of potential prior contamination to the groundwater. *See* Memorandum from Michael Leach, ADEQ Hydrologist, to Tom Curry, ADEQ WQARF Coordination Unit, re: "Van Buren Tank Farm – Final Summary Site Assessment Report" (ADEQ, 1990), (noting that contaminants from facilities could also reach the water table by way of surface conduits [such as drywells] with very little detectable contamination of the vadose zone.")

[21] EPA regional screening levels (RSLs) and soil screening levels (SSLs), last updated January 2015 and published at http://www.epa.gov/region9/superfund/prg/. Data based on target cancer risk of 1x10^{-6} and target hazard quotient of 1.0

Profiles of Target COCs

Brief summaries regarding the hazardous properties for each of the target COCs, obtained from the EPA and Agency for Toxic Substances and Disease Registry (ATSDR), are included below.

TCE:

- Chemical Classification: volatile organic compound
- Summary and Uses: TCE is a nonflammable, colorless liquid with a somewhat sweet odor and a sweet, burning taste. It is used mainly as a solvent to remove grease from metal parts, but it also is an ingredient in adhesives, paint removers, typewriter correction fluids, and spot removers. TCE is not found naturally in the environment. However, it has been found in underground water sources and many surface waters as a result of the manufacture, use, and disposal of the chemical.
- Cancer Effects:[22] carcinogenic in humans[23] by all routes of exposure; strong evidence of causal association with TCE exposure in humans and kidney cancer and non-Hodgkin lymphoma; less well defined association of TCE exposure to other types of cancer, including liver, biliary tract, bladder, esophageal, prostrate, cervical, breast and childhood leukemia.
- Non-Cancer Effects:[24] potential human health hazard for non-cancer toxicity to the central nervous system, kidney, liver, immune system, male reproductive system, and the developing fetus.
- Ecological Impacts: according to background analysis of TCE environmental toxicity contained in the June 2014 *TSCA Work Plan Chemical Risk Assessment* (EPA, 2014), TCE poses a negligible ecological risk to aquatic and terrestrial biota due to its moderate persistence, low bioaccumulation potential, and low aquatic toxicity. The promulgation of significantly higher (less stringent) surface water quality standards for TCE applied to aquatic and wildlife designated uses under the Clean Water Act corroborates the overall low concern for potential ecological impacts related to TCE releases.

PCE:

- Chemical Classification: volatile organic compound

[22] Toxicology Review of Trichloroethylene, In Support of Summary Information on the Integrated Risk Information System, EPA/635/R-09/011F, US EPA, Washington, DC, September 2011. (EPA, 2011)
[23] The National Toxicology Program announced that TCE should be reclassified as a "known human carcinogen" from "reasonably anticipated to be a human carcinogen," in a draft report released June 27, 2014. The report indicated there is sufficient evidence based on studies in humans that exposure to TCE causes kidney cancer in humans. The draft report further states there is only limited evidence in human studies that TCE exposure causes non-Hodgkin lymphoma and there is insufficient evidence to evaluate the relationship between TCE exposure and liver cancer. The draft report is undergoing peer review. (National Toxicology Program, 2014)
[24] *Ibid.*

- Summary and Uses: PCE is a manufactured chemical, not found naturally in the environment, that is widely used for dry cleaning of fabrics and for metal degreasing. It also is used to make other chemicals and is used in some consumer products.
- Cancer Effects:[25] likely to be carcinogenic to humans by all routes of exposure based on epidemiologic evidence associating PCE exposure in humans with several types of cancer, including bladder, non-Hodgkin lymphoma, and multiple myeloma and animal studies of increased incidence of liver, kidney, and testicular tumors.
- Non-Cancer Effects:[26] potential human health hazard for non-cancer toxicity to the central nervous system, kidney, liver, immune and hematologic system, and on development and reproduction.
- Ecological Impacts: PCE has similar physical and chemical properties to that of TCE and is anticipated to behave similarly in having overall limited ecological impacts on aquatic and terrestrial biota due to its moderate persistence, low bioaccumulation potential, and low aquatic toxicity (EPA, 2014). The promulgation of significantly higher (less stringent) surface water quality standards for PCE applied to aquatic and wildlife designated uses under the Clean Water Act corroborates the overall low concern for potential ecological impacts related to PCE releases.

1,1-DCE:

- Chemical Classification: volatile organic compound
- Summary and Uses: 1,1-DCE is an industrial chemical that is not found naturally in the environment. It is a colorless liquid with a mild, sweet smell. It also is called vinylidene chloride. 1,1-DCE is used to make certain plastics, such as flexible films like food wrap, and in packaging materials. It also is used to make flame retardant coatings for fiber and carpet backings, and in piping, coating for steel pipes, and in adhesive applications. 1,1-DCE may be found in the environment from the biotic or abiotic breakdown of PCE, 1,1,1-TCA, 1,1,2-TCA, and 1,1-DCA.[27]

[25] Toxicology Review of Tetrachloroethylene, In Support of Summary Information on the Integrated Risk Information System, EPA/635/R-08/011F, US EPA, Washington, DC, February 2012. (EPA, 2012)
[26] *Ibid.*
[27] Researchers have identified the following compounds as daughter compounds of TCE, TCA, and PCE degradation: (1) 1,1-DCE; (2) 1,2-DCE; (3) 1,1-DCA; (4) chloroethane; (5) chloroethene; (6) ethanol; (7) acetic acid; and, (8) carbon dioxide. Suzanne Lesage, Richard E. Jackson, Mark W. Priddle, & Peter G. Riemann, *Occurrence and Fate of Organic Solvent Residues in Anoxic Groundwater at the Gloucester Landfill, Canada*, 24 Environmental Science and Technology, 559, 564 (1990) (providing a flowchart of parent compounds degrading into daughter compounds). Researchers and EPA have taken the position that abundant sources of organic carbon, including fuel hydrocarbons, are a driving force behind the chemical reactions, which create chlorinated daughter compounds inside VOC-contaminated groundwater. *See* EPA, *Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater*, 3, 23-26 (1998) (explaining that the chemical reaction facilitated by organic carbon is "reductive dechlorination") (EPA, 1998). In fact, ADEQ reviewed leaking underground storage tanks as potential sources for VOC-contaminated groundwater "*because of the potential for petroleum hydrocarbon contamination to facilitate natural biodegradation of VOCs."* ADEQ, *Final Remedial Investigation Report, WCP East Grand Avenue WQARF Site, Phoenix, Arizona, 2-15* (June 2006). (ADEQ, 2006b).

- Cancer Effects:[28] EPA considers 1,1-DCE to be a possible human carcinogen based on animal studies; there are limited and inconclusive data for assessment of human carcinogenic potential.
- Non-Cancer Effects:[29] no information is available on the non-cancer health effects associated with human exposure to 1,1-DCE. In animal studies, the target organs associated with 1,1-DCE exposure are the liver, kidney, and lungs.
- Ecological Impacts: 1,1-DCE has similar physical and chemical properties to that of TCE and is anticipated to behave similarly in having overall limited ecological impacts on aquatic and terrestrial biota due to its moderate persistence, low bioaccumulation potential, and low aquatic toxicity (EPA, 2014). The promulgation of significantly higher (less stringent) surface water quality standards for 1,1-DCE applied to aquatic and wildlife designated uses under the Clean Water Act corroborates the overall low concern for potential ecological impacts related to 1,1-DCE releases.

Routes of Potential Exposure

According to the *Final WVBA RI Report*, groundwater pumpage is the major outflow from the groundwater system and is therefore the main exposure pathway for COCs that have been released to surface and subsurface soils and entered groundwater to come in contact with environmental receptors. The exposure point occurs when the contaminated groundwater is withdrawn from the aquifer and enters the outfall to the water provider's water distribution system (into canal water).

The primary water supply wells within the WVBA WQARF Site are those operated by RID. RID wells pump and discharge contaminated groundwater into a system of discharge boxes, water transmission lines (mostly buried), and conveyance canals. As identified in the previous discussion, the exposure pathway and potential for target COC releases to impact aquatic and terrestrial biota in of low concern. Consequently, further discussion of routes of potential exposure to target COCs and associated risks will focus on the substantially more significant concern for potential hazards to human health.

Primary public exposure routes to COCs discharged into the RID water system include inhalation (air),[30] ingestion (water), and dermal absorption. Public exposure is controlled at RID

As noted in Honeywell's Additional Site Characterization Work Plan (April 2003), "an important aspect of the presence of fuel hydrocarbons is the chlorinated solvent biodegradation (anaerobic dechlorination) stimulated by the fuel hydrocarbons. … Therefore, the areas at the Site where anaerobic biodegradation of chlorinated solvents is enhanced coincide with the areas of free-phase and dissolved-phase fuel hydrocarbons. … In summary, detection of the chlorinated solvent byproducts of TCE and 1,1,1-TCA in groundwater samples collected from groundwater monitor wells indicates that reductive dechlorination occurs within and downgradient of the Honeywell Site."

[28] Toxicology Review of 1,1-Dichloroethylene, In Support of Summary Information on the Integrated Risk Information System, EPA/635/R02/002, US EPA, Washington, DC, June 2002. (EPA, 2002)

[29] *Ibid.*

[30] The Final RI Report fails to address the volatilization of the COCs into the air as a contributing factor for the

well sites by security fencing that precludes general public access, but is uncontrolled outside of the RID well sites at open segments along canals/laterals (ingestion and dermal absorption) and where volatilization/engineering controls have not been installed at the discharge structure for each well (inhalation).[31] Engineering controls have only been installed at RID-89, RID-92, RID-95 and RID-114 where wellhead treatment systems were voluntarily constructed pursuant to the RID-95 Wellhead Treatment Systems Proposal as agreed to by ADEQ (ADEQ, 2011c). Further discussion of the extent of contamination impacts and environmental fate of COCs in groundwater, surface water and air in the WVBA WQARF Site is given in Section 3.4.

With respect to impacts to other water provider wells, ADHS completed a health risk assessment in October 1992 addressing the potential threat to drinking water wells. The study was conducted in anticipation of potential groundwater contamination of COT wells by the westerly groundwater movement of the WVBA WQARF Site plume. The study concluded there would be significant health effects from domestic consumption of groundwater containing COCs at concentrations similar to those found in ADEQ monitor wells located near 67th Avenue and West Van Buren Street.[32]

Finally, as stated in the *Final WVBA RI Report*, vapor intrusion is a potential exposure pathway. "Once released to the unsaturated zone, VOCs can volatilize into soil gas, which can migrate upwards to the ground surface. Depending on the land use/surface cover, soil gas can either be released directly to the atmosphere, become trapped beneath impermeable structures, or migrate into structures either beneath or at the ground surface. Typically, vapor intrusion will occur at or near the contaminant (in this case VOC) source area, but can also occur via off-gassing from the groundwater. The likelihood of vapor intrusion via this pathway decreases with increasing depth to groundwater."[33] This *PRAP*, consistent with the *RID FS Report*, does not address vapor intrusion issues due to the observed depth to groundwater in the WVBA Site, which minimizes the potential for vapor migration to land surface.

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reduced VOC concentrations within 125 feet of the point of discharge.

[31] *See* ADEQ's Approval of RID's Modified Early Response Action Work Plan (February 1, 2013) (requiring that measures be implemented to limit exposures that might cause long-term effects based on data that significant volatilization and transfer of contaminants, from water into the air, is occurring and ongoing.) (ADEQ, 2013a)

[32] In January 2015, ADHS performed a health consultation report at the request of certain parties identified as Potentially Responsible Parties (PRPs), who may be liable for the costs incurred to address the groundwater contamination in the WVBA WQARF Site. Although some PRPs argued that the ADHS health consultation report declared there would be no health risk if the contaminated water supply was used as a domestic water supply, ADHS confirmed that the "risk assessment was conducted based on contact with the water for recreational use and gardening." When comments were submitted to ADHS clarifying that there were independent aquifer water quality standards and maximum contaminant levels applicable to the contaminated aquifer and its future use as a domestic water supply, ADHS noted that such comments "address[ed] areas beyond the scope of this report." Additionally, the ADHS Health Consultation Report did not address the Cancer Risk Evaluation Guide (CREG) that ATSDR has developed for TCE (0.75 µg/L) and PCE (17 µg/L). CREG is a media-specific comparison value that is used to identify concentrations of cancer causing substances that are unlikely to result in an increase of cancer rates in an exposed population after a lifetime of exposure (ADHS, 2015). The ADHS Health Consultation Report, comments and ADHS response are available on ADEQ's website for the WVBA Site.

[33] Terranext, 2012

2.3 HISTORY OF REMEDIAL INVESTIGATIONS AT WVBA WQARF SITE

Following is a brief summary of the chronology of WVBA WQARF Site activities. For a more substantive summary, please refer to the *Final WVBA RI Report*.

1986 Groundwater contamination was first detected in the WVBA WQARF Site, originally called the Van Buren Tank Farm Study Area, during groundwater sampling conducted by Chevron USA Inc. (Chevron) at its facility in the Phoenix Terminal located south of Van Buren Street, and between 51st and 55th Avenues. Because Chevron reportedly had never used the solvents detected,[34] the Arizona Department of Water Resources (ADWR) conducted an area-wide groundwater investigation in conjunction with the ADHS.

1987 The WVBA WQARF Site was placed on the WQARF Registry as a priority site in November.

1988 ADEQ contracted with Kleinfelder, Inc. (Kleinfelder) to conduct the preliminary site investigation. Since 1988, ADEQ and several companies within the WVBA WQARF Site have conducted investigations of contaminated soil and groundwater. Initial field work included groundwater monitoring, soil sampling, examining area land uses, reviewing past and current disposal practices of industrial operations, and analyzing the potential health risks of identified COCs.

1989 A Phase I report was finalized for ADEQ in July. The report concluded that five (5) COCs were found in groundwater at levels above EPA MCLs.

1991-1998 A Phase II groundwater investigation was conducted in 1991 and sampling report issued in 1992.

In October 1992, ADHS completed a health risk assessment addressing the potential threat to COT drinking water wells. The study was conducted in anticipation of potential groundwater contamination of wells by the westerly groundwater movement of the WVBA WQARF Site plume. The study concluded there would be significant health effects from domestic consumption of groundwater containing COCs at concentrations similar to

[34] *See* Memorandum from Michael Leach, ADEQ Hydrologist, to Tom Curry, ADEQ WQARF Coordination Unit, re: "*Van Buren Tank Farm (VBTF) – Final Summary Site Assessment Report*" (Feb. 26, 1990) noting that despite claims that "VBTF facilities could not be responsible for the halogenated [HVOC] contamination found in the groundwater underlying the site because the site operations don't use or store any HVOCs … [and] no HVOCs were detected as a result of soil sampling of the vadose zone," that "evidence developed by [VBTF facilities] indicates that HVOCs have been stored or used, and have subsequently been detected in soil samples collected from UNOCAL, one of the VBTF facilities. In addition, as explained in my 3-16-89 memo, contaminants from the other VBTF facilities could also reach the water table by way of surface conduits (such as drywells) with very little detectable contamination of the vadose zone." (ADEQ, 1990)

those found in ADEQ monitor wells located near 67th Avenue and West Van Buren Street. COT's most easterly well is located at approximately 83rd Avenue and Harrison Street. In response, COT removed potentially affected wells from service. As indicated in the *Final WVBA RI Report*, COT currently receives most of its water from the COP through an Intergovernmental Agreement. The four (4) operating COT wells are used mainly during summer months for backup supply purposes. Two (2) ADEQ monitor wells have been installed at 79th Avenue, north and south of the RID canal, between the leading edge of the plume and the COT municipal well field to monitor groundwater quality in the area of concern.[35]

ADEQ conducted a soil investigation at the Maricopa County Materials Management (MCMM) facility in 1992 as a result of groundwater contamination detected in an ADEQ monitor well located downgradient of the MCMM facility. ADEQ also installed three (3) groundwater monitor wells at the MCMM facility. Maricopa County then conducted a site characterization of its facility and installed and operated a soil vapor extraction (SVE) system to remove the hazardous substances.

In November 1992, ADEQ encouraged approximately 50 parties to form a steering committee to address groundwater contamination issues in the WVBA WQARF Site. Participants of the steering committee formed the West Van Buren Group (WVBG). The WVBG was a key component of the steering committee. The makeup and formal membership of the WVBG varied during the mid-1990s, and originally consisted of: Reynolds Metals Co. (Reynolds Metals), Van Waters & Rogers Inc. (VW&R), Maricopa County, Dolphin, Inc. (Dolphin), American Linen Supply Company (ALSCo, formerly Maroney's Cleaners), and ChemResearch Company, Inc. (ChemResearch). ChemResearch, ALSCo, and Maricopa County withdrew from the WVBG by 1995. The WVBG suspended further negotiations with ADEQ for a site-wide consent agreement in June 1996 in anticipation of Arizona legislative changes that were enacted to the WQARF program in 1997.

In May 1997, ALSCo settled with ADEQ for $2 million; a federal court approved the Consent Decree between ADEQ and ALSCo in August 1997. No settlement was negotiated between ADEQ and Maroney's Cleaners & Laundry.

Two well inventories were conducted by Kleinfelder and Weston to identify groundwater wells located within/adjacent to the WVBA WQARF Site. Information obtained from the surveys was used to identify wells for

[35] Although ADEQ monitor wells located east of 79th Avenue do not have detectable PCE or TCE concentrations, this does not delineate the extent of the WVBA WQARF Site groundwater contamination. Recent sampling in March 2014 of well RID-82 located at 83rd Avenue and McDowell Road indicate PCE and TCE have been detected at concentrations of 3.53 µg/L and 1.22 µg/L, respectively. As shown in **Figure 2**, RID-82 had 2.95 µg/L of PCE and 1.00 µg/L of TCE when sampled in September 2013.

collecting groundwater samples. Concurrent with the well inventory, Weston developed a Phase I database followed by a conceptual model. Weston (2000 and 2001) developed a five-layer model with seasonal stress periods as a final end product (i.e., Central Phoenix Plume Model).

By the end of 1998, site investigation work included installation of 35 monitor wells by Kleinfelder (8), Weston (14), Fluor Daniel GTI (6) and GEC (7).

1999 ADEQ retained Terranext (previously known as BE&K/Terranext) to perform RI activities. Terranext developed project plans and initiated on-going site characterization activities including: a well inventory; monitor well installations; water level measurements; groundwater sampling; preparation of water level and COC concentration contour maps; and monitor well abandonments.

2000 Reynolds Metals received a No Further Action (NFA) letter for soils within 14 specific areas at its facility by ADEQ. A Resources Conservation and Recovery Act (RCRA) Consent Decree was issued to Dolphin by ADEQ in January.

2001 Pursuant to AAC R18-16-406(D), a Land and Water Use Study was prepared. Terranext gathered information on current and foreseeable land and water usage through interviews, COP General Plan maps, ADWR well database, aerial photographs, and facility reports submitted to ADEQ and zoning maps from the COP, COT, and Maricopa County. Updates since 2001 were obtained through researching current information and issuing a questionnaire to stakeholders within the WVBA WQARF Site. Two (2) different questionnaires were developed for stakeholders. One focused on property owners within the WVBA Site and one focused on municipalities/utilities. A final *Land and Water Use Study* can be found in Appendix K of the *Final WVBA RI Report* along with sample questionnaires.

In January, the WQARF Program collected $410,000 from Dolphin to be used in remedial action on the WVBA WQARF Site plume's threat to COT drinking water wells.

Upon completion of site characterization and soil remediation, Maricopa County and Union Pacific Railroad, one of the previous owners of the MCMM property, negotiated a settlement with ADEQ. In October, Maricopa County and Union Pacific Railroad settled with ADEQ for $450,000 for ADEQ's response and oversight costs. ADEQ continues to investigate the ownership and tenant history of the facility to evaluate whether other entities may also be responsible for contamination detected at the MCMM facility.

2002 Reynolds Metals entered into a Consent Decree with the State of Arizona in September. The Consent Decree resolved the alleged liability and potential liability of Reynolds Metals by seeking recovery of costs, recovery for natural resource damages, injunctive relief, and declaratory judgment. Reynolds Metals settled with ADEQ for $1,956,474 in October.

ADEQ issued a NFA letter to VW&R for soils, which terminated a 1996 Consent Decree. VW&R paid ADEQ $7,711 for oversight costs incurred.

2005 ADWR conducted a review of its database, ADEQ files, and conducted field surveys to identify monitor wells within and adjacent to the WVBA WQARF Site. Information from this survey was used to identify duplicates in the ADEQ database and identify private wells for sampling. The data was submitted to ADEQ in database format for incorporation into the ADEQ database (September). Twenty-nine domestic wells were identified in or adjacent to the WVBA WQARF Site; of these, five (5) are located within the Site and provide groundwater for domestic use. In order to gain access to domestic wells, ADEQ attempted to contact domestic well owners through certified letters and residential visits. ADEQ was able to gain access to four (4) of the five (5) domestic wells for sampling. No VOCs (analyzed by EPA Method 8260B with the reporting limit ranging from <0.50 µg/L to <20 µg/L) were detected in any of the groundwater samples collected from the four domestic wells.

2006 Dolphin received closure of the 2000 RCRA Consent Decree in June.

2008 ADEQ granted ALSCo an NFA determination for soil in March.

Terranext issued the *Draft RI Report* during October.

RID submitted comments to ADEQ on the *Draft RI Report* in December, requesting immediate action to mitigate groundwater contamination impact on RID wells and water operations.

2009 In early 2009, RID initiated voluntary remedial actions to address the groundwater contamination impacting and threatening its wells within the WVBA WQARF Site.

In September, RID met with the Potentially Responsible Party (PRP) Group to discuss response actions and settlement opportunities.

In September, RID voluntarily submitted the *Implementation Plan* (Montgomery & Associates [M&A], 2009a) to ADEQ[36] and entered into an agreement with ADEQ to conduct an ERA and FS.

[36] Further explanation of RID response actions following the voluntary submittals of the *Draft Implementation Plan* and subsequent *ERA Work Plan* are included in Section 2.4.2.

In October, RID voluntarily submitted the Draft *Early Response Action Work Plan* (M&A, 2009b) to ADEQ

2010 In early 2010, RID responded to public comments on the Draft *ERA Work Plan (M&A, 2010)*.

In June, ADEQ approved the Draft *ERA Work Plan* with conditions.

2011 In May, ADEQ issued the *Proposed RO Report* for public comment.

In August, RID voluntarily submitted the *RID-95 Wellhead Treatment Systems Proposal* (Synergy , 2011).

In September, ADEQ agrees to the RID-95 Wellhead Treatment Systems Proposal and Working Group submits *Draft FS Work Plan* (Haley & Aldrich, 2011).

2012 In February, RID voluntarily initiated treatment at well RID-95.

ADEQ issued the *Final RO Report* and Terranext issued the *Final WVBA RI Report* in August.

RID voluntarily submitted a *Modified ERA Work Plan* (Synergy, 2012c) in October.

2013 In February, ADEQ approves the *Modified ERA Work Plan*, and RID voluntarily submitted Draft *Final FS Work Plan* (Synergy, 2013a)

RID voluntarily submitted a *Final FS Work Plan* (Synergy, 2013c) in June.

In July, ADEQ approved the *RID FS Work Plan*, and Working Group submitted its *Final FS Work Plan* (Haley & Aldrich, 2013).

In August, ADEQ approves the Working Group's *FS Work Plan*.

2014 In July, RID (Synergy, 2014a) and the Working Group (Haley & Aldrich, 2014a) voluntarily submit draft *FS Reports* for ADEQ approval

In November, RID (Synergy, 2014b) responded to ADEQ's administrative review checklist and submitted a revised *FS Report*.

In December, the Working Group (Haley & Aldrich, 2014b) responded to ADEQ's administrative review checklist and submitted a revised *FS Report*; both *FS Reports* were published for public comment.

2015 In April, ADEQ approved both the RID and Working Group *FS Reports* after significant public comments.

2.4 EARLY RESPONSE ACTIONS

Pursuant to AAC R18-16-405, an ERA is authorized to address current risks to public health, welfare, and the environment; to protect or provide a supply of water; to address sources of contamination; or to control or contain contamination where such actions are expected to reduce the scope or cost of the remedy needed at the site. The following sections describe the ERAs conducted or currently underway at the WVBA WQARF Site.

2.4.1 FACILITY-SPECIFIC RESPONSE ACTIONS

ADEQ conducted an ERA at the ALSCo facility to address a known source of VOC contamination. The ERA was initiated to reduce VOC concentrations in soils and control the migration of VOCs to, and in, groundwater beneath the facility. As part of the ERA, a SVE, air sparge (AS), and groundwater extraction and treatment remediation system were installed and operated periodically from 2001 to 2003. Confirmation sampling following system shut down indicated that the ERA remedial action objectives (RAOs) were accomplished. The ending soil gas PCE and TCE concentrations indicated that the unsaturated zone RAOs of 20 μg/L for PCE and 14 μg/L for TCE were met, and VOC concentrations detected in downgradient wells were similar to those in upgradient wells. According to a 2006 *WVBA WQARF Site Fact Sheet* prepared by ADEQ (ADEQ, 2006a), over 900 pounds of VOCs were removed by the SVE/AS system before it was shut down in October 2002. The groundwater pump and treat system was shut down in September 2003 after treating approximately 118 million gallons of groundwater and removing 24 pounds of VOCs.

2.4.2 RID EARLY RESPONSE ACTIONS

RID currently is conducting a voluntary ERA to address the widespread threat and impact of COCs on its wells and water supply in the WVBA WQARF Site. The groundwater contamination in the WVBA WQARF Site has impacted[37] or threatens to impact all 32 of the RID water supply wells located within the WVBA WQARF Site boundary and at least one RID well adjacent to and down gradient from the WVBA WQARF Site.[38]

Pursuant to AAC R18-16-405.I, the RID ERA is "necessary" as a matter of law because "[i]n considering whether an early response action is necessary to protect or provide a supply of water because a well is threatened by contamination, a well located in the area within ¼ mile

[37] *See* Agreement to Conduct Work between ADEQ and RID, dated October 8, 2009 (ADEQ determined that releases or threatened releases of hazardous substances have occurred, resulting in groundwater contamination that has impacted multiple RID water supply wells which may present an imminent and substantial endangerment to the public health, welfare or the environment within the WVBA WQARF Site). (ADEQ, 2009)

[38] RID well 82 is located at 83rd Avenue and McDowell, approximately one mile beyond the currently defined western boundary of the WVBA WQARF Site. In sampling conducted in March 2014, RID well 82 had 3.53 μg/L PCE and 1.22 μg/L TCE. This well was not operational during the March 2015 sampling event.

upgradient, ½ mile cross-gradient and 1 mile down-gradient of the areal extent of contamination at the site shall be presumed to be threatened by the contamination." RID's wells and water supply in the WVBA WQARF Site already are either impacted or threatened by COCs in the groundwater as defined in AAC R18-16-405.I. The RID ERA was initiated voluntarily and is "necessary" to mitigate threats and impacts to RID wells, its operations and water uses; to mitigate current risks to public health from exposures to contaminants in the groundwater and to contaminants that volatilize into the air; to reduce the scope and costs of the regional groundwater remedy; and, ultimately, to provide RID with unrestricted use of its water supply for all reasonably foreseeable end uses.[39]

In early 2009, RID initiated voluntary remedial actions to address the COC groundwater contamination impacting and threatening its wells and water supply in the WVBA WQARF Site. These actions began shortly after the ADEQ Draft Remedial Investigation Report (Terranext, 2008) was issued. From early 2009 to the present, RID has attempted to engage stakeholders in order to develop a cost-effective regional groundwater remedy. Significant milestones in this process are as follows:

- Jan 2009: RID and ADEQ meet with EPA to discuss remedial actions
- Feb 2009: RID meets with ADEQ and Attorney General's Office to discuss proposed remedial actions
- Feb 2009: RID attends WVBA Community Advisory Board (CAB) meeting
- Sep 2009: RID meets with PRP Group to discuss response actions and settlement opportunities
- Oct 2009: RID voluntarily submits Draft *Implementation Plan* (M&A, 2009a) to ADEQ
- Oct 2009: RID enters into agreement with ADEQ to conduct voluntary ERA and FS in the WVBA WQARF Site
- Nov 2009: RID voluntarily submits *Early Response Action Work Plan* (M&A, 2009b) to ADEQ
- Dec 2009: RID attends and presents at WVBA CAB meeting
- Jan 2010: RID voluntarily submits *Early Response Action Work Plan* (M&A, 2010) to ADEQ

  Jun 2010: RID responds to public comments on RID *ERA Work Plan*
- Mar 2010: RID attends and presents at WVBA CAB meeting
- Jun 2010: ADEQ grants approval of the RID ERA Work Plan with conditions
- Sep 2010: RID holds meetings with prospective contractors to conduct ERA work
- Jun 2011: RID attends and presents at WVBA CAB meeting

[39] *See* AAC R18-16-405.A.

- Jul 2011: RID releases *Request for Qualifications* (RFQ) for design/build/own/operate for RID-95 Wellhead Pilot Treatment Systems
- Aug 2011: RID voluntarily submits *RID-95 Wellhead Treatment Systems Proposal* (Synergy, 2011) to ADEQ
- Sep 2011: ADEQ agrees to *RID-95 Wellhead Treatment Systems Proposal*
- Sep 2011: RID issues Notice to Proceed for RID-95 Wellhead Pilot Treatment Systems
- Feb 2012: RID voluntarily initiates treatment at RID-95
- Mar 2012: RID voluntarily submits *Technology/Design Demonstration Report* (Synergy, 2012a) to ADEQ: RID-95 Pilot System completed, treatment initiated at three (3) additional treatment sites pursuant to *RID-95 Wellhead Treatment Systems Proposal*
- Jul 2012: RID submits *Draft Modified ERA Proposal* (Synergy, 2012c) to ADEQ
- Aug 2012: ADEQ issues *Final WVBA RI Report*
- Oct 2012: RID submits voluntarily *Modified ERA Work Plan* (Synergy, 2012d) to ADEQ
- Dec 2012: RID attends and presents at WVBA CAB meeting
- Dec 2012-Jan 2013: RID responds to public comments on *Modified ERA Work Plan*
- Feb 2013: ADEQ issues approval of *RID Modified ERA Work Plan* with conditions
- Feb 2013: RID submits voluntarily *Draft FS Work Plan* (Synergy, 2013a) to ADEQ
- Feb 2013-Jun 2013: RID responds to public comments on *RID Draft FS Work Plan*
- Apr 2013: RID voluntarily completes the *Long-Term Operational Assessment* (Synergy, 2013b) of wellhead treatment systems and submits report to ADEQ
- Apr 2013: RID attends and presents at WVBA CAB meeting
- Jul 2013: ADEQ approves *RID FS Work Plan*
- Oct 2013: RID voluntarily submits Operation and Maintenance Plan (Synergy, 2013d) to ADEQ
- June 2014: ADEQ publishes *RID O&M Plan* for public comment
- Jul 2014-Nov 2014: ADEQ receives comments and responses to comments on *RID O&M Plan*
- Apr 1015: ADEQ certifies RID's *Revised O&M Plan* with conditions
  ADEQ approves the *RID FS Report* after significant public comments

The original *ERA Work Plan* voluntarily submitted by M&A in February 2010, on behalf of RID, included four (4) conceptual components: 1) a new priority pumping regimen for the RID well field to maximize removal of COCs from the groundwater and to protect RID's threatened wells while maintaining current annual groundwater withdrawal rates and meeting the seasonally variable demand of RID's customers; 2) construction of a new centralized groundwater treatment facility (CGTF) to reliably remove COCs and reduce their concentrations to meet standards acceptable for all reasonably foreseeable end uses of the waters of the state in the WVBA WQARF Site; 3) physical improvements to selected RID wells and canals to control emission of COCs from water to air and to control exposure to COCs; and 4) discharge of remediated water supply to the RID Main Canal for irrigation use or to a delivery system for potable use.

Under the original *ERA Work Plan*, the ERA would predominantly use existing RID pipelines and canals to convey up to a nominal 20,000 gallons per minute (gpm) of contaminated groundwater pumped from the 10 most highly contaminated RID wells to the CGTF that would be constructed on RID property adjacent to the Main Canal at 84th Avenue. A new pipeline would be constructed from the terminus of the Salt Canal at 83rd Avenue to the CGTF. Separate new pipelines would be installed later in the ERA to convey groundwater with lower VOC concentrations (RID wells 105, 109, and 110) south to the Main Canal and to convey groundwater with higher VOC concentrations (RID wells 89, 92, 95, and 100) north to the Salt Canal and then to the CGTF for treatment. Installation of these pipelines would enable treatment of impacted groundwater from RID wells with the highest COC concentrations, which would afford public health and welfare protection from the higher concentrations of these contaminants and provide substantial COC mass removal from the environment during the ERA.

Under the original *ERA Work Plan*, the new treatment facility would remove thousands of pounds of COCs from the groundwater annually and discharge remediated water of sufficient quality for all RID current and reasonably foreseeable end uses. Under state law,[40] no remedial or response action can reduce the quantity of RID's water supply or restrict the quality of RID's water supply from its "maximum beneficial use" or its "current or reasonably foreseeable end uses."

The objectives of the voluntary RID ERA remedial action are:

- To protect and provide a water supply from the most highly contaminated RID wells in the WVBA WQARF Site that is protective of all RID current and reasonably foreseeable municipal, agricultural, and industrial end uses; and,
- To address current and future risks to public health, welfare and the environment from exposures to contaminants in the groundwater that are known to volatilize into the air when pumped from the most highly contaminated RID wells.

[40] *See* ARS § 49-282.06.A.2 and B.4.b

ADEQ approved the original *ERA Work Plan*[41] with conditional tasks in a letter dated June 24, 2010 (ADEQ, 2010a). The conditional tasks included a public health exposure assessment, well investigations, groundwater modeling and engineering studies. The work conducted for each task is summarized in **Appendix A** of the *RID FS Report*.

A *Modified ERA Work Plan* (Synergy, 2012c) voluntarily was submitted by RID to ADEQ on October 19, 2012 to improve upon the original ERA (M&A, 2010). The *Modified ERA Work Plan* proposed using wellhead treatment systems at select RID well sites in lieu of the central groundwater treatment facility. The modification to the original ERA was proposed in order to provide a more cost-effective approach to protect the RID water supply while achieving all of the statutory and regulatory requirements for an ERA.

The *Modified ERA Work Plan* provided a more efficient approach to address these objectives and incorporated information and insights gained from the conditional tasks prescribed by ADEQ in the original ERA Work Plan approval letter and the RID-95 Wellhead Treatment Systems Proposal (summarized in **Appendix A** of the *RID FS Report*). The modifications proposed to the ERA were consistent with WQARF program authority[42] and certain[43] stakeholder input submitted to ADEQ during the public comment period of the original RID ERA. Among those substantial comments, a recurring critique was that the proposed original RID ERA, as approved by ADEQ, was large, costly, technically complex, and unsound to treat huge volumes of water at a centralized plant. Specifically, the comments noted that,

- *"…the contaminated plume can be remediated in a far more efficient approach by focusing on contaminant source areas and zones of highest contaminant concentrations."* (City of Phoenix, 2010b)
- *"…RID does not mention the possibility of targeting the wells with the highest levels of contaminants … numerous reasonable options could be envisioned for targeting "hot spots" in the West Van Buren Plume … this option could result in the targeted removal of contaminant mass at similar levels as RID's proposal, but with a much more simplified system and at much lower cost."* (Honeywell, 2010)

[41] Contrary to claims by parties identified as PRPs, who may be liable for the costs incurred to address the groundwater contamination, ADEQ's approval of the original RID ERA Work Plan was a formal approval that is protected by statutory procedures like any ADEQ-approved permit. *See* Letter from Henry Darwin, ADEQ Deputy Director, to David Armstrong, attorney for SRP, re: ADEQ Response to Request for Interim Decision (Oct. 13, 2010) (declaring that "ADEQ's June 24, 2010 approval of RID's February 3, 2010 ERA Work Plan is a final decision" and that "ADEQ has and will continue to evaluate RID's adherence to [procedures, statute and rule] … and if compliance is not achieved revoke the approval under the appropriate legal procedures." (ADEQ, 2010b)

[42] AAC R18-16-405.H.3.

[43] Substantial stakeholder comments were received from parties that are identified as PRPs for releases of hazardous substances and have vested interests in avoiding remedial actions that will impose costs to address site-wide groundwater contamination. Additionally, certain parties with professed competing water rights raised comments that are in direct contradiction to RID's basic right provided by the WQARF program, pursuant to AAC R18-16-411.G, that allows any water provider to take necessary actions, **in its sole discretion** (emphasis added), to implement an ERA that will address the use of its impacted or threatened wells in a WQARF site.

- *"Groundwater pump-and-treat, if selected as an ERA or a final remedy, should focus first, and perhaps only, on areas having the highest concentrations within the plume. This strategy has proven to be very effective in the Motorola 52nd Street Operable Unit 2 groundwater extraction system."* (Dolphin, 2010)
- *"…an effective early response action would consider* [among other listed elements] … *strategically located capture wells for containing the regional plume … supplemented with pumping at the leading downgradient edge of the plume … some or all of the groundwater could be treated to reduce the transfer of VOCs from the current plume to the air*." (Salt River Project, 2009)

Based on the insights and information indicated above, the *Modified ERA Work Plan* proposed the following modifications to the original ADEQ-approved *ERA Work Plan*, which are consistent with the prior stakeholder comments:

- Utilization of wellhead treatment at the most highly contaminated RID wells and blending to effectively reduce the concentration of VOCs from several additional wells, with lower contaminant concentrations, to achieve target water quality. This approach will result in a lower volume of contaminated water being directly treated while providing a higher total volume of contaminated well water that will be remediated to meet applicable MCLs to ensure protection of all RID current and reasonably foreseeable water supply end uses.
- Elimination of approximately 25,000 feet of north-south lateral pipelines between the southern tier wells and the Salt Canal; and
- Elimination of the gravity pipeline between the end of the Salt Canal and the RID Maintenance Yard (i.e., the central water treatment facility location).

The proposed modifications also provided additional ancillary benefits believed to result in the following performance improvements as compared to the original *ERA Work Plan*:

- Reduce capital costs by approximately 50%, from approximately $34 million to approximately $18 million;
- Reduce O&M costs by approximately 50%, from approximately $3.0 million to $4.0 million per year to approximately $1.5 million to $2.0 million per year;
- Enable blending of treated water with untreated water from wells having lower contaminant concentrations along the Salt Canal, thereby increasing the total volume of contaminated well water that will be remediated to meet applicable MCLs by approximately 50%;
- Significantly reduce the time required to implement the early response pump and treatment action due to the simplified and modular nature of the wellhead treatment systems (compared to central water treatment facility) and the elimination of the complex and disruptive construction of north-south lateral pipelines; and,

- Reduce the scope and cost of the groundwater remedy at the WOC WQARF Site by addressing the groundwater contamination that is migrating into the WVBA WQARF Site and impacting and threatening to impact RID's water supply wells.

ADEQ approved the *Modified ERA Work Plan* with conditions on February 1, 2013 (ADEQ, 2013a). As provided by ADEQ in that letter, ADEQ's approval is subject to the following conditions:

1. RID must maintain historical pumping rates to ensure that there are no adverse impacts to groundwater quality and levels; and,
2. RID must follow through on the commitment to implement measures to limit exposures to public from the contamination being released from the RID water systems.

RID has maintained historical pumping rates in the RID wells located in the WVBA WQARF Site and will continue to do so until modeling has demonstrated that increased extraction at the most highly contaminated RID wells with wellhead treatment will not adversely impact groundwater levels in the region or groundwater quality. RID also implemented volatilization control measures at the four (4) RID wells with wellhead treatment and enclosed one of the laterals used to convey impacted groundwater. RID intends to continue to implement these engineering control measures to limit potential public exposure.

2.5 COMMUNITY INVOLVEMENT ACTIVITIES

Public participation and community relations activities during the PRAP process will adhere to the community involvement requirements of AAC R18-16-404 and ADEQ's *Community Involvement Plan [CIP] for West Van Buren WQARF Site, Phoenix, Arizona* (ADEQ, 2011a) as discussed in Section 10.0. Consistent with the CIP, ADEQ will lead the public outreach and coordinate public communication and comments. Specific community involvement activities may include the preparation and distribution of public notices describing the availability of this *PRAP* for public review and participation in public meetings to discuss the document. It is anticipated that ADEQ will continue the agency's practices of complying with the public participation requirements of the WQARF program evident during the RI reports, RID's ERA, the RO Report, the FS Work Plan and FS Report. In fact, ADEQ maintains an Internet website[44] that contains a large number of relevant documents about the WVBA WQARF Site, including the public participation efforts.

In order to broaden communication outreach and enhance transparency, RID, in coordination with ADEQ, will continue to deliver messages and information through the various communications channels and platforms developed for its ADEQ-approved ERA. These channels and platforms may include one-on-one briefings, group presentations, electronic and

[44] Accessible through ADEQ Waste Programs page or http://www.azdeq.gov/environ/waste/sps/wvb.html

print media, and web-based communications. RID has continually used these various channels and platforms to reach out to the local community and involve stakeholders during the past five (5) years regarding all work activities undertaken at the WVBA WQARF Site. Specifically, RID has participated in over 100 separate meetings with various external stakeholders including the EPA, ADEQ, ADWR, Central Arizona Project (CAP), community leaders, individual PRPs and PRP groups, elected officials, COP, COT, City of Avondale, City of Goodyear and City of Buckeye.
RID has been diligent in its efforts to keep the public informed of planned and on-going field programs. RID hand delivered informational flyers, in both English and Spanish, to residents and businesses in the areas where RID's wellhead treatment systems were installed (to date about 1,000 flyers have been provided) and continues to distribute email updates of monthly progress reports and other project information to interested parties. Likewise, RID offers tours of the treatment facilities to interested parties to inform them of RID's voluntary treatment progress.

RID has been involved in every WVBA CAB meeting since December 2009. Although the WVBA CAB has not met very regularly, RID has approached ADEQ and offered to provide presentations to the WVBA CAB at more frequent intervals to update the CAB on the progress of the ADEQ-approved ERA, the RID-95 Wellhead Pilot Treatment Systems Initiative, and RID FS process and report. Despite the lack of WVBA CAB meetings, RID developed and continues to maintain an Internet website[45] that contains updated information on RID's work activities and provides all relevant information relating to the ADEQ-approved ERA that is accessible to the general public.

The Community Involvement Area for the WVBA, as described in the CIP, is located in Congressional District 7. The WVBA also is located within the boundaries of Legislative Districts 19, 27, and 30, COP Council Districts 4, 7, and 8 and Maricopa County Supervisors District 5. The following elected officials represent these affected districts:

- Congressional District 7: Representative Paul Gosar
- Arizona Legislative District 19: Senator Lupe Chavira Contreras
Representative Mark A. Cardenas
Representative Diego Espinoza
- Arizona Legislative District 27: Senator Catherine Miranda
Representative Reginald Bolding Jr.
Representative Rebecca Rios
- Arizona Legislative District 30: Senator Robert Meza
Representative Jonathan Larkin
Representative Debbie McCune Davis

[45] http://www.wvgroundwater.org

- Phoenix City Council District 4: Councilwoman Laura Pastor
- Phoenix City Council District 7: Councilman Michael Nowakowski
- Phoenix City Council District 8: Councilwoman Kate Gallego

- Maricopa County Supervisor District 5: Supervisor Steve Gallardo

RID, in coordination with ADEQ, will provide periodic briefings and updates to elected officials in the WVBA to assure that they are informed with regards to the ongoing voluntary remediation efforts and the development and implementation of the proposed regional groundwater remedy.

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3.0 SITE CHARACTERIZATION

This section provides a general overview of the geology and hydrogeology of the WVBA and adjacent areas, identifies potential contaminant sources, and summarizes the nature and extent of contamination at the WVBA WQARF Site. Detailed summaries of site characteristics are provided in Section 3 of the *RID FS Report*.

3.1 HYDROGEOLOGIC SETTING

The WVBA WQARF Site and adjacent regional contaminant sites are located in the West Salt River Valley (SRV) in a broad sediment-filled basin formed as a result of basin-and-range structural development that mostly occurred between 15 and 8 million years ago (Brown and Pool, 1989). Crustal extension, which caused the downward faulted sedimentary basin, created a large structural depression that contains more than 11,000 feet of basin-fill sediments in the central part of the West SRV. Basin fill sediments derive from the surrounding mountains and through-flowing streams such as the Salt, Gila, and Agua Fria rivers. The West SRV basin is almost completely surrounded by mountains composed of granitic, metamorphic and volcanic rocks.

The geology of the West SRV is well known (Brown and Pool, 1989; Corkhill et al., 1993) through interpretation of available lithologic, geologic, and geophysical data from the drilling of deep wells throughout the West SRV. Generally,[46] the basin fill deposits are differentiated into three (3) distinctive hydrogeologic units that are referred to as (from oldest to youngest) the: Lower Alluvial Unit (LAU), Middle Alluvial Unit (MAU), and Upper Alluvial Unity (UAU). The following descriptions taken from Brown and Pool (1989) and Terranext (2012) provide a basic overview of the three (3) principal basin-fill sedimentary units:

Lower Alluvial Unit

The LAU consists mainly of conglomerate and gravel grading into mudstones in the center of the basin. The LAU is subdivided into lower and upper parts. Both parts are generally fine-grained, but differ in consolidation, homogeneity, types of evaporite deposits and structure. The lower part of the LAU is moderately to well-cemented mudstone, siltstone, sand and gravel containing significant gypsum, anhydrite, and halite. The upper part of the LAU is weakly to moderately cemented and consists of silt, clay, mudstone, siltstone, and gypsum with interbedded sand and gravel. The LAU may be as much as 1,000 feet thick at basin margins and more than 10,000 feet thick in the center of the basin.

[46] This discussion of regional sedimentology excludes the Red Unit. According to Brown and Pool (1989), the Red Unit was deposited prior to the basin-and-range structural development and is found mostly in the southeast part of the West SRV.

Middle Alluvial Unit

The MAU overlies the LAU and consists of weakly consolidated, but moderately to well-cemented silt, clay, silty sand, and gravel. Collectively, the MAU contains more than 40 percent sand and gravel throughout most of the basin. Generally, grain size decreases downward in the MAU. The MAU ranges in thickness from 0 to 800 feet in the West SRV. The contact between the LAU and MAU is gradational, but distinguishable by a greater bedding frequency or heterogeneity and a buff or brown color as opposed to red-brown. The uppermost interval of the MAU is characterized by a clay layer at least 40 feet thick, that is typically described as a hard brown clay or sticky brown clay.

Upper Alluvial Unit

The UAU consists of unconsolidated Quaternary-aged silt, sand, and gravel that extend from the top of the MAU to ground surface. The gravel-size sediments can be quite coarse and include cobbles and boulders. UAU sediments range in thickness from 200 to 500 feet. Within the WVBA, the UAU is differentiated as two sub-layers referred to as UAU1 and UAU2. The UAU1 layer ranges in thickness from approximately 170 to 310 feet bls and is comprised of unconsolidated mixtures of clay, silt, and sand in the upper 10 feet to 50 feet bls that overlie a relatively thick sequence of gravels and cobbles with varying amounts of sand, clay, and silt. The transition between UAU1 and underlying UAU2 is gradational and characterized by an increase in clay content until clays dominate the lithologic horizons. The thickness of the UAU2 is variable, ranging from approximately 30 to 260 feet or greater.

Further description of geologic conditions in the WVBA and adjacent contaminated sites is provided in Section 3.1 of the *RID FS Report*.

In the West SRV, groundwater occurs in the UAU, MAU and LAU, and is stored and moves under different regimes based on hydraulic properties within the aquifer units. Hydraulic properties vary between and within the alluvial aquifers due to notable heterogeneities that exist across the West SRV. As reported by Brown and Pool (1989), groundwater in the UAU is unconfined and the most permeable and productive of the hydrostratigraphic units. Groundwater in the underlying MAU and LAU is under confined (Weston, 2000) to leaky and semi-confined conditions (Brown and Pool, 1989).

Wells completed within the UAU yield between 1,500 and 5,500 gpm and have measured hydraulic conductivity ranging from 50 to 1,700 feet per day (ft/d). Yield to wells in the MAU and LAU is appreciably less than the UAU, ranging from several hundred to 2,000 gpm. Hydraulic conductivity in the MAU and LAU is generally in the range of 3 to 60 ft/d. According to Terranext (2012), it is apparent from pumping data and observed water level responses in nearby wells that the three units are hydraulically interconnected.

Groundwater movement within the WVBA WQARF Site is predominantly controlled by pumping and the areal distribution of Salt River recharge. Groundwater pumping by RID represents the major outflow from the groundwater system within the WVBA WQARF Site. The bulk of groundwater extraction from RID wells in the WVBA is from the UAU and largely from depths that correspond to the UAU1 interval. RID pumpage within the WVBA WQARF Site[47] has ranged from around 75,000 to 94,000 acre-feet (AF) per year from 2008 to 2012, with an annual average of about 83,500 AF. As noted in the *Final WVBA RI Report*, pumping of this magnitude exerts significant hydraulic control on area-wide groundwater within the WVBA and the upgradient WOC and M52 Sites. RID pumping is seasonal with demand for water in the summertime frequently requiring pumping of all RID wells in this area at their maximum groundwater extraction rate of around 85,000 gpm.

Further description of groundwater hydrology in the WVBA and adjacent contaminated sites is provided in Section 3.2 of the *RID FS Report*.

3.2 IDENTIFICATION OF CONTAMINANT SOURCES

Numerous facility investigations in the WVBA and adjacent regional groundwater contaminant sites have documented releases, or threatened releases, of hazardous substances that are COCs in the regional groundwater contaminant plume impacting the WVBA WQARF Site. This section provides a general summary of the more notable contaminant sources. More detailed summaries of the contaminant sources are provided in Section 3.3 of the *RID FS Report*.

3.2.1 WEST VAN BUREN AREA FACILITIES

ADEQ has conducted or directed numerous facility investigations that are identified in the *Final WVBA RI Report*. The findings indicate that over 50 facilities in the WVBA WQARF Site were determined to have had documented COC contamination in soils or soil gas. As noted in the *Final WVBA RI Report*, ADEQ decided to focus on the following nine (9) facilities[48] as most notable contamination sources within the WVBA WQARF Site:

- Air Liquide America Specialty Gases, LP (ALASG);

[47] Consisting of 33 RID wells, designated by consecutive well numbers RID-82 through RID-114.

[48] The rationale to exclude certain facilities from further groundwater investigations is unclear since it appears a number of facilities never completed the investigative work required by ADEQ. Additionally, as noted in stakeholder comments to ADEQ on the *Draft RI Report*, at least 16 of the 42 facilities where further investigations were not performed had detectable concentrations of at least one VOC in soil (Univar USA, Inc. 2008). It is indicated that this is particularly significant because soil investigations conducted to determine the releases of VOCs in soils were done at a time when soil sampling did not include procedures to minimize VOC loss during sampling. Consequently, Univar stressed that the presence of VOCs in soils indicated the potential for the presence of an onsite source of VOCs to groundwater. It is important to note that these VOCs are not naturally occurring and the presence of the VOCs in the soil must have resulted from a release at the facility.

- ALSCo;
- ChemResearch;
- U.S. Department of Energy (USDOE);
- Dolphin;
- Maricopa County Materials Management (MCMM);
- Prudential Overall Supply (POS);
- Reynolds Metals; and,
- Van Waters & Rogers (now Univar USA, Inc.).

Appendix B of the *RID FS Report* summarizes facility operations, source area investigations and remedial activities conducted at each facility, as originally presented in the *Final WVBA RI Report*.

3.2.2 MOTOROLA 52ND STREET CERCLA SITE

The M52 Site encompasses the regional groundwater contamination plume to the east of the WVBA WQARF Site as shown in **Figure 2** and is subdivided into three operable units: OU1, OU2, and OU3. The M52 Site is a federal site under CERCLA authority and EPA has designated numerous entities as potentially responsible parties (PRPs) for the groundwater contamination identified in the M52 Site. In addition, according to ADEQ's Narrative Site Information for the M52 Site, on September 3, 2003, EPA issued CERCLA General Notice letters to the following companies in OU2:

- D-Velco Manufacturing of Arizona
- Honeywell International, Inc.
- City of Phoenix
- U.S. Air Force
- ITT Industries
- Kachina Technical Services and Processes, Inc.
- Phoenix Industrial Properties, Ltd.
- Joray Corporation
- Laundry and Cleaners Supply, Inc.
- Papago Plating Company, Inc.
- B and G Investments
- Thomas and Nancy Stonebraker

According to information presented by Terranext (2012) in the *Final WVBA RI Report*, the following parties have also been identified as PRPs at OU3:

- Arizona Public Service/Pinnacle West Capital Corporation
- Arvin Meritor/Adobe Air/Cooper Industries
- Baker Metal Products

- Capitol Engineering
- Fruehauf Trailer Sales/Wabash National Trailer Centers
- McCoy's Laundry and Dry Cleaners
- Milum Textile Services Company
- Phoenix Newspapers
- Salt River Project
- Walker Power Systems/Tierney Turbines
- Union Pacific Railroad
- Westinghouse

Finally, a number of facilities have been identified[49] as potential sources within the scope of City of Phoenix investigation of the Sky Harbor International Airport Area:[50]

- Arizona Wholesale Supply
- Continental Airlines
- DynAir Tech.
- Lockheed Air Terminal
- Arizona Tool Products
- C.S.&W Contractors
- Frontier Airlines
- Pacific Southwest Airlines
- Pride Expeditors
- PSA/US Air
- Sky Harbor Airport Airline Maintenance
- Trans World Airlines
- Transco
- United Airlines
- Wien Air Alaska

3.2.3 WEST OSBORN COMPLEX WQARF SITE

Contaminated groundwater north of the WVBA WQARF Site between 27th and 51st Avenues is associated with the WCP Area and is being managed by ADEQ. The WCP Area was placed on the WQARF Registry as a priority site in 1987 and later divided into five (5) separate WQARF Registry sites in 1998: 1) East Grand Avenue, 2) West Grand Avenue, 3) North Plume, 4) North Canal Plume, and 5) West Osborn Complex (WOC), of which the WOC is the southernmost site and, therefore, most closely associated with the WVBA WQARF Site.

[49] Memorandum from David Hawkins to Lowell Carty, Project Manager for East Washington WQARF Site, re: "List of facilities to be evaluated in the East Washington Study Area" (ADEQ, 1989). However, as noted above, the COP initially identified 218 facilities within the SHA Site, but not all of these were investigated.
[50] *See* Section 3.3.2 of the *RID FS Report* for more detailed information about the history and prior investigations of the Sky Harbor International Airport Area.

The WOC WQARF Site and other West Central Phoenix WQARF sites are identified as potential sources of the groundwater contamination plume to the north of the WVBA WQARF Site, as shown in **Figure 2**.

As indicated in the *Final WVBA RI Report*, three (3) facilities have been identified as likely sources of groundwater contamination:

- United Industrial Corporation (UIC)
- Corning Inc./Components Inc.
- Nucor Corporation

It also appears clear that sources other than the WOC Site have impacted shallow and possibly deeper contamination in the plumes at the WOC Site. In this regard, historical VOC releases from facilities associated with the nearby North Canal Plume and East and West Grand Avenue WQARF sites are suspected by WOC facility operators (GeoTrans, 2012a and 2012b) to have commingled with groundwater contamination in the WOC Site plume.

3.3 NATURE AND EXTENT OF CONTAMINATION

As summarized in the previous section, site investigations have been conducted at numerous industrial and commercial facilities throughout the regional groundwater contaminant area over the past 25 years. These investigations have identified many widespread sources of VOC contamination in soil and groundwater throughout the WVBA WQARF Site and adjacent regional groundwater contaminant sites. The impact of these source areas on area-wide groundwater has been documented by remedial investigations that include data from a network of over 100 monitor wells.

The following sections summarize the nature and extent of COCs and the potential routes of migration of these contaminants in the environment within the WVBA WQARF Site. A more detailed analysis of the nature and extent of contamination is provided in Section 3 of the *RID FS Report*.

3.3.1 SOIL/UNSATURATED ZONE

Numerous facilities within the WVBA WQARF Site and adjacent M52 Site and WCP sites have documented releases of PCE, TCE, and other chlorinated VOCs that comprise the COCs in the regional groundwater contaminant plume. Releases of solvents in chemical products and wastes containing VOCs as a result of spills, leaks, discharges, and waste disposal practices provide a direct mechanism for downward vertical contaminant migration through the unsaturated zone and/or possibly migration as soil vapor to the land surface.

Within the WVBA WQARF Site, depth to groundwater currently ranges from approximately 75 to 140 feet bls (Terranext, 2013). In past decades, when historic releases more likely occurred, groundwater levels were significantly higher resulting in a more direct and rapid pathway for contaminant transport to groundwater as well as greater potential for vapor flux from shallow groundwater contamination to migrate upwards to the ground surface.

Terranext (2012) also indicates that COCs released to the unsaturated zone can volatilize into soil gas, which will migrate upwards to the ground surface. Depending on the extent of facility development, the soil gas may discharge directly to the atmosphere, become trapped beneath impermeable structures, or migrate into structures either beneath or at ground surface.

The *RID FS Report* assumed that actions taken to date under ADEQ oversight have adequately characterized and addressed the known sources of hazardous substances impacting the surface and subsurface soils in the WVBA WQARF Site. It also is assumed that any additional source control actions that may be required to eliminate or mitigate a continuing source of contamination or address vapor intrusion will be facility-specific and subject to ADEQ's lead and oversight. Should any further information arise that identifies the need to address a presently unknown source of hazardous substances or loss or impairment of land use caused by contamination of surface and subsurface soils, it is further assumed that ADEQ will, independent of the WVBA WQARF Site regional groundwater remedy, assure that necessary actions are taken to remediate or control the hazardous substances causing the impairment or restriction to the land and/or groundwater use.

3.3.2 GROUNDWATER

Information from the *Final WVBA RI Report* indicates that VOCs are prevalent in groundwater throughout a large portion of the WVBA WQARF Site. The data indicate widespread VOC contamination within the UAU and, to a significantly lesser degree, the MAU by TCE, PCE, 1,1-DCE, and other compounds that may be breakdown products. Further, the *Final WVBA RI Report* indicates that these same VOC contaminants are entering the WVBA WQARF Site from upgradient areas to the east (M52 Site) and north (WOC Site).[51]

Terranext (2012) indicates that PCE is the predominant COC for the WVBA WQARF Site. Although this may be true in terms of the magnitude of contamination detected historically within the WVBA WQARF Site, at present TCE occurs as prevalently, if not more so, than PCE. In fact based on data reported in first quarter 2013 (Terranext, 2013) and provided in **Table 1**, 52 of the 94 UAU monitor wells sampled have detectable PCE concentrations while 56 wells have detectable TCE levels. The maximum PCE concentration measured at this time was 87.5 μg/L at

[51] As discussed in prior sections, additional information prepared by and for ADEQ indicates VOCs from the upgradient SHA and other WCP sites are commingling with contaminants from the M52 Site and WOC Site and are entering into the WVBA WQARF Site.

well AVB 119-01, whereas the maximum TCE concentration was 177 μg/L at well AVB 132-01. Additionally, concentrations of up to 31.7 μg/L cis-1,2-DCE, 29.4 μg/L 1,1-DCE, and 10.4 μg/L 1,1-DCA were observed. Based on these data and the recent EPA toxicity studies,[52] TCE is the more significant target COC for the WVBA WQARF Site.

PCE and TCE are similarly prevalent in RID water supply wells in the WVBA WQARF Site and vicinity. Of the 33 RID wells within and adjacent to the WVBA WQARF Site, 22 wells had detectable PCE concentrations and 19 wells had detectable TCE concentrations when sampled in 2013 (see **Table 2**). The maximum PCE concentration measured at this time was 22.1 μg/L at well RID-106, whereas the maximum TCE concentration was 86.4 μg/L at well RID-92. The concentration of PCE, TCE, and 1,1-DCE in the RID water supply wells over time is shown on graphs provided in **Figure 3**.[53]

Given that groundwater within the WVBA WQARF Site largely moves in response to pumping, PCE and TCE contamination transport in groundwater is generally by advection, which is through bulk groundwater movement. Although chlorinated solvent compounds such as PCE and TCE may biodegrade under appropriate conditions, this occurs slowly, if at all, in aerobic groundwater such as the UAU (ERM, 2010). With exception of portions of the M52 Site, the SHA Site and the Phoenix Fuel Terminal, located between 51st and 55th Avenue along Van Buren Street, where bulk petroleum products leaked to shallow groundwater, conditions within the regional commingled groundwater contaminant plume are not conducive to biodegradation.

Concentrations of individual VOCs detected in RID water supply wells and at WVBA WQARF Site groundwater monitor wells are not uniform, and there are notable spatial variations that suggest multiple sources have contributed to the regional commingled groundwater contaminant plume, and are still contributing to the plume. The spatial variations in VOC concentrations are particularly evident in UAU1 groundwater in earlier representations of water quality data provided in the *Final WVBA RI Report* (e.g. years 1998 and 2003). Maps showing the distribution of PCE concentrations in UAU1 groundwater monitoring wells in 1998 and 2003 that were provided in **Figures 4 and 5** of the *RID FS Report* indicate relatively high PCE concentrations present in groundwater at four (4) locations, or hotspots, in the vicinity of facilities owned and/or operated by ALSCO, ChemResearch, Dolphin, and Prudential Overall Supply. High PCE concentrations that were historically observed at source areas such as the Dolphin and ALSCo facilities have attenuated substantially over time.

Maps showing the distribution of TCE concentrations observed in these same wells in 1998 and 2003 that were provided in **Figures 6 and 7** of the *RID FS Report* show more extensive regions of elevated TCE concentrations as opposed to hot spots as defined by the PCE occurrence. For example, a broad region of relatively high TCE concentrations occurs in the east-central WVBA WQARF Site. This suggests that a plume of commingled TCE contamination originates from

[52] *See* footnote 19.
[53] *See* footnote 9.

sources upgradient of the WVBA WQARF Site (e.g., the M52 Site) as well as within this portion of the WVBA WQARF Site.

More recent maps depicting PCE and TCE occurrence in UAU1 and UAU2 groundwater monitoring wells were provided in **Figures 8 through 11** of the *RID FS Report*. As evident, the areal extent of PCE and TCE plumes is approximately the same as the earlier monitoring periods, but with the exception of relatively high TCE concentrations throughout the east-central WVBA, the COC concentrations have substantially declined. The MAU is indicated to have very limited impact with monitoring data indicating only two wells in the vicinity of 67th Avenue and Van Buren Street to be impacted above AWQSs.

With respect to groundwater contamination entering the WVBA WQARF Site from the east, monitoring data in both the M52 Site and eastern part of the WVBA WQARF Site indicate M52 Site remedial actions are effectively decreasing TCE concentrations in the UAU groundwater plume. For example, as shown in **Figure 3**, since initiation of groundwater pumping of OU2 extraction wells in 2001, TCE levels at RID-114 and other RID wells in the eastern core of the WVBA plume have declined appreciably. The data suggest that the significant decline in TCE concentrations occurring at RID-114 by at least 2011 correlate to OU2 groundwater remedial actions to cut off and contain westward contaminant migration that began 10 years earlier. In response to the reduced mass loading associated with M52 Site interim groundwater remedies, TCE concentrations are expected to slowly decrease in the eastern portion of the WVBA WQARF Site over time.

With respect to groundwater contamination entering the WVBA WQARF Site from the north, the WOC Site *Final FS Report* (GeoTrans, 2012a) confirms a relatively large geographic area has been impacted by plume migration to the south of the WOC Site. Conservative contaminant concentrations derived from the central portion of the Shallow Groundwater System (SGWS) include TCE at 180 μg/L, PCE at 5 μg/L, and 1,1-DCE at 25 μg/L. Based on observed water quality data from the monitor well network in this area, as shown in **Figure 4**, the COC concentrations in the shallow groundwater plume extending south toward the WVBA WQARF Site have remained relatively constant over time and suggest persistent COC mass is migrating from the WOC Site to the WVBA WQARF Site. The limited scope of the proposed WOC Site groundwater remedy is not anticipated to reduce COC mass loading entering the WVBA WQARF Site from the WOC Site.[54]

Sampling results from RID wells provide a useful basis to interpret water quality impacts within the WVBA WQARF Site. As opposed to monitoring wells that only characterize discrete depth intervals of the contaminant plume, water quality data at RID water supply wells represent

[54] The *Proposed Remedial Action Plan* for the SGWS consists of 30 gpm groundwater extraction and treatment for source control at the WOC Site along with Monitored Natural Attenuation of the plume south of the WOC Site. Prevailing groundwater flow in the WOC Site is generally to the south in response to annual RID pumping of around 50,000 gpm of groundwater, on average.

composite conditions throughout the primary zone of groundwater contamination since RID wells typically produce groundwater from the entire contaminated UAU aquifer. The historical trends of COC concentrations[55] in RID wells are indicators of area-wide fate and transport of COCs from the various source contributions. The data allow differentiation of the WVBA WQARF Site into five (5) specific regions based on the temporal and spatial COC concentration trends in the RID well field, as shown in **Figure 5**, to help define priorities for applied remedial strategies and measures to achieve a more focused and cost-effective proposed regional groundwater remedy for the WVBA WQARF Site.[56]

Eastern Core

Within this region, as shown in **Figure 6**, RID-110, RID-112, RID-113, and RID-114 are predominantly impacted by TCE at concentrations generally ranging from 10 to 100 μg/L, whereas PCE concentrations are consistently less than 5 μg/L. The largest TCE concentrations observed in this region occur at RID-114, which formerly had levels as high as 110 μg/L in 2006 that have declined to 45.6 μg/L in 2014. TCE concentrations in all wells in this region have similarly declined since the mid 2000s. The RID water supply wells in this region appear to be impacted by dissolved phase transport of TCE from multiple, indistinct releases in the eastern portion of the WVBA WQARF Site and in groundwater entering the WVBA WQARF Site from the M52 Site.

Southeast Lobe

Within this region, as shown in **Figure 7**, RID-99, RID-102, and RID-104 are almost exclusively impacted by PCE at variable but relatively low level concentrations ranging from about 5 to 10 μg/L. TCE, if detected, is typically found at concentrations less than 1 μg/L. RID-99 with a concentration of 8.3 μg/L PCE is the only well in this region that exceeds AWQSs. PCE concentrations in all wells appear to be declining somewhat. Commingled groundwater contamination within this region is more limited and localized.

Southern Flank

Within this region, as shown in **Figure 8**, RID-89, RID-92, and RID-95 are dominantly impacted by TCE at concentrations ranging from about 30 to 80 μg/L, although PCE also is observed at concentrations ranging from 5 to 20 μg/L. RID-92 has the highest TCE and PCE concentrations in this region at about 80 and 15 μg/L, respectively. TCE and PCE levels in the RID water supply wells in this region are not declining which suggests the wells are impacted by dissolved phase contamination that may be associated with continuing source contribution and/or the presence

[55] As mentioned in Section 2.2, PCE and TCE are the predominant target COCs at the WVBA WQARF Site and will be the focus of the discussion that follows.
[56] WQARF rules allow an approach that may incorporate different strategies for portions of the aquifer pursuant to AAC R18-16-407.E.1.

of dense non-aqueous phase liquids (DNAPLs), possibly from multiple sources. Recent monitoring data obtained at RID water supply wells along the Main Canal, such as RID-91, indicate TCE contamination is increasingly impacting threatened RID wells in this region.

North Central

Within this region, as shown in **Figure 9**, RID-107, RID-108, RID-109, and RID-110 are impacted by variable, but relatively lower level concentrations of both TCE and PCE ranging from 5 to 10 μg/L. RID-109 currently has the highest TCE and PCE concentrations observed in this region at about 10.6 and 7.2 μg/L, respectively. There are no clear spatial or temporal trends apparent in this region suggesting that multiple, indistinct sources, such as dissolved phase transport from local facility releases within the WVBA WQARF Site and from groundwater entering the WVBA WQARF Site from the WOC Site, are commingling and likely contributing to well impacts in this region.

Leading Edge

Within this region, as shown in **Figure 10**, RID-84 and RID-106 are predominantly impacted by PCE at concentrations ranging from 10 to 25 μg/L and lesser TCE concentrations. RID-106 currently has the highest PCE and TCE concentrations observed in this region at about 22 and 8 μg/L, respectively, although both wells had PCE concentrations at around 50 μg/L in the past. Over the past 10 years, COC concentrations have slowly declined indicating dissolved phase transport of PCE and TCE, likely attributed to multiple releases in the western portion of the WVBA WQARF Site. Even though the *Final WVBA RI Report* indicates the western boundary of the WVBA WQARF Site extends to around 75th Avenue, it should be noted that PCE and TCE contamination at 3.53 μg/L and 1.22 μg/L, respectively, is present in RID well 82, located at 83rd Avenue and McDowell.[57]

3.3.3 POTENTIAL OCCURRENCE OF DNAPLs

Groundwater within the WVBA WQARF Site is impacted by VOCs that are chlorinated solvents, which are denser than water. The potential presence of liquid-phase VOCs from releases of these chlorinated solvents (commonly referred to as DNAPLs) can serve as a long-term source of dissolved contaminant plumes and persist in groundwater over a long time. Data compiled in the *Final WVBA RI Report* provide indications of notably high PCE concentrations at the four (4) facilities identified below. Based on methodology discussed in Section 3.4.3 of the *RID FS Report,* the potential occurrence of subsurface DNAPL at these sites is as follows:

- **VERY HIGH** at the Dolphin facility because the maximum observed PCE concentration in groundwater (63% of PCE aqueous solubility) exceeds 50% of its pure-phase solubility.

[57] Based on RID well sampling conducted in March 2014.

- **HIGH** at the ALSCo facility because the maximum observed PCE concentration in groundwater (28% of PCE aqueous solubility) is between 10 and 50% of its pure-phase solubility of PCE.
- **MEDIUM** at the MCMM facility because the maximum observed PCE concentration in groundwater (2.8% of PCE aqueous solubility) is between 1 and 3% of its pure-phase solubility of PCE.
- **MEDIUM** at the ChemResearch facility because the maximum observed PCE concentration in groundwater (1.2% of PCE aqueous solubility) is between 1 and 3% of its pure-phase solubility of PCE.

3.3.4 CANAL/SURFACE WATER

There has been limited characterization of the nature and extent of contamination in surface water at the WVBA WQARF Site. The work that has been done pertains to RID water conveyance canals, since the RID water distribution system is the only surface water resource impacted by WVBA WQARF Site COCs. In this regard, the *Final WVBA RI Report* indicated that the RID water supply wells that extract and discharge VOC-contaminated groundwater to surface water are the major outflow of contamination from the WVBA WQARF Site, and noted that the RID canals[58] provide a potential route of surface water and contaminant migration downstream of the WVBA WQARF Site.

Characterization of the fate and transport of contaminants in the RID water conveyance canals within the WVBA WQARF Site is provided in two references: 1) the *Roosevelt Irrigation District Canal Characterization Report* (BE&K/Terranext, 2001) and 2) the *Public Health Exposure Assessment and Mitigation Summary Report* (Synergy, 2011c). In general these studies indicate VOC concentrations within RID surface water conveyances are significantly reduced downstream of discharging RID water supply wells due to volatilization and, at points of discharge to the Main Canal, dilution. Water quality data obtained by sampling and analysis of VOCs in the RID water supply systems document the occurrence of TCE and PCE at levels safely below numeric limits established for Arizona Surface Water Quality Standards for dermal exposure by partial and full body contact during bathing and swimming in the open RID laterals and canals as well as ingestion of fish caught in these waterways.

[58] The RID water supply system is largely open to public access. RID has taken a number of measures to limit and prevent public use of open RID canals and laterals, including signage to warn people not to swim or consume water and the use of contractor security personnel to patrol sections of the water system. RID also voluntarily has taken steps to close open sections of laterals by installing and burying pipelines for water conveyance. For example, when it came to RID's attention that the public was swimming and drinking highly contaminated water at an open lateral on 27th Avenue, RID voluntarily took immediate action to install piping to limit public access.

3.3.5 AIR

There also has been limited characterization of the nature and extent of contamination in air potentially attributed to the WVBA WQARF Site. The *Final WVBA RI Report* indicates that vapor intrusion is one of *"... four potential routes of migration ... identified for VOCs released into the unsaturated zone in the WVBA"* (see Routes of Exposure summary included in Section 2.2) but neglects to elaborate on air impacts from volatilization of contaminants that occurs during discharge and conveyance of contaminated groundwater in the RID water supply delivery system. Such neglect is inconsistent with ADEQ's policy to prohibit the transfer of contaminants from one environmental media to another (*e.g.*, from groundwater to air).[59]

The fate of COCs in groundwater pumped from RID water supply wells and conveyed through gravity pipelines and open canals is determined, in large measure, by the individual contaminant's physical and chemical properties. The main route of transfer of PCE, TCE, and 1,1-DCE from water is volatilization (EPA, 1981). This behavior is consistent with the compounds' relatively high Henry's Law constants. Laboratory studies cited in toxicity profiles generated by ATSDR (1997) have demonstrated that PCE and TCE rapidly volatilize from water.

Volatilization that occurs in the RID water supply delivery system transfers COCs from groundwater to ambient air. Based on the last 10 years of data (2004-2013), the magnitude of the impact at the WVBA WQARF Site, estimated using VOC concentrations obtained from ADEQ sampling of impacted RID water supply wells (see **Table 2**) and RID historical pumping records (discharge volume), is approximately 2,900 pounds of target COCs released to the local environment annually. A summary of the estimated mass of target COCs released by year to the local environment is included as follows:[60]

[59] This policy was not neglected in ADEQ's approval of RID's *ERA Work Plan* or *Modified ERA Work Plan*: "long-term effects are uncertain and data also show that 'significant volatilization and transfer of contaminants, from the water to air, is occurring and ongoing'" such that a specific condition within ADEQ's approval of the *Modified ERA Work Plan* is for RID "to implement measures to limit these exposures." ADEQ's policy was not recognized in the WVBA CIP that instead concluded: "*In spite of the contaminants currently found in some soils and in the groundwater at the site, the public health impacts are minimal because none of the drinking water wells in use within the site have been found to be contaminated."*

[60] It should be noted that the estimated mass removal rates pertain to RID pumping under an operating strategy that intentionally restricts pumping of the most highly contaminated wells. Historically, RID operations favored pumping of their larger producing wells on the Main Canal, which are on the periphery of the plume, more than the contaminated wells located in the interior plume. In more recent years, RID has limited discretionary pumping of the most highly contaminated wells so as to reduce pollutant transfer. Consistent with the ADEQ-approved RID FS Report, the *PRAP* will prioritize pumping of the most highly contaminated wells equipped with treatment to enhance VOC mass removal. For example, had RID conducted priority pumping in 2013 consistent with that deemed feasible in the remedial alternatives evaluated in the FS Report, then the projected mass removal would have ranged from 2,500 to about 3,200 pounds of target COCs. Such priority pumping would increase mass removal by approximately 25 to 50 percent.

RID WATER SUPPLY WELLS – MASS REMOVAL ESTIMATES
FROM 2004 TO 2013, WVBA WQARF Site
(values presented are estimated pounds of target COCs released)

2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	TOTAL
3,500	2,975	3,575	3,150	3,330	2,815	2,760	2,625	2,200	2,070	**29,000**

RID conducted limited-scope sampling of air and water from RID water supply well discharges and surface conveyances of contaminated groundwater to measure VOC contamination entering the environment and provide insight into the fate and transport of these contaminants. The limited-scope sampling event was intended to facilitate a preliminary assessment of the potential risk to the public health from inhalation of COCs released to the air from RID water supply system operations in the WVBA WQARF Site. The findings indicate concentrations of target COCs in ambient air are less than screening-level guidelines for acute and sub-acute exposures developed by ADHS and ATSDR. As such, it is reasonable to conclude that the current air emissions from RID water supply well discharges and water supply conveyance do not pose an acute risk to public health.

While there does not appear to be an acute exposure risk to the public from these contaminants, the long-term effects from public exposure to uncontrolled air emissions cannot be determined by this limited-scope sampling event.[61] The results revealed the presence of WVBA WQARF Site target COCs in all air samples obtained in and proximal to the RID water supply wells and water supply conveyance systems. In contrast, target COCs were not detected in air samples collected in background locations situated away from the RID water supply system. The data demonstrate that the presence of target COCs in air is directly associated with the RID pumping and conveyance of contaminated groundwater in the WVBA WQARF Site. Additionally, mass balance determinations indicated substantial transfer of target COCs from water to air from the discharge of contaminated groundwater and conveyance into the RID receiving water system.

[61] *See* ADEQ's Approval of RID's *Modified Early Response Action Work Plan* (February 1, 2013) requiring that measures be implemented to limit exposures that might cause long-term effects based on data that significant volatilization and transfer of contaminants, from water into the air, is occurring and ongoing. (ADEQ, 2013a)

4.0 PRAP SCOPING

This section presents information on regulatory remedial requirements, ROs identified by ADEQ for the WVBA WQARF Site, ROs at adjacent sites, and extent of impacts to area water providers.

4.1 REGULATORY REQUIREMENTS

The Arizona legislature has established specific remedial action criteria pursuant to ARS § 49-282.06 that must be met in the consideration and selection of remedial action(s) for the WVBA WQARF Site.

Among other requirements, remedial actions[62] shall:

- Assure the protection of public health and welfare and the environment;
- Provide for the control, management or cleanup of the hazardous substances in order to allow the maximum beneficial uses of waters of the state, to the extent practicable; and,
- Be reasonable, necessary, cost-effective, and technically sound.

Additionally, for remediation of waters of the state, "the selected remedy must address, at a minimum, any well that at the time of the remedial action either supplies water for municipal, domestic, irrigation or agricultural uses or is part of a public water system if the well would now or in the reasonably foreseeable future produce water that would not be fit for its current or reasonably foreseeable end uses without treatment due to the release of hazardous substances."[63]

Additionally, the following factors must be considered in selecting remedial actions:[64]

1. Population, environmental and welfare concerns at risk;
2. Routes of exposure;

[62] Pursuant to ARS § 49-281, "remedial action" means "those actions that are reasonable, necessary, cost-effective and technically feasible in the event of the release or threat of release of hazardous substances into the environment, such actions as may be necessary to investigate, monitor, assess and evaluate such release or threat of release, actions of remediation, removal or disposal of hazardous substances or taking such other actions as may be necessary to prevent, minimize or mitigate damage to the public health or welfare or to the environment which may otherwise result from a release or threat of release of a hazardous substance. Remedial actions include the use of biostimulation with indigenous microbes and bioaugmentation using microbes that are nonpathogenic, that are nonopportunistic and that are naturally occurring. Remedial actions may include community information and participation costs and providing an alternative drinking water supply."
[63] *See* ARS § 49-282.06.B.4.b.
[64] *See* ARS § 49-282.06.C.

3. Amount, concentration, hazardous properties, environmental fate, such as the ability to bioaccumulate, persistence and probability of reaching the waters of the state, and the form of the substance present;
4. Physical factors affecting human and environmental exposure such as hydrogeology, climate and the extent of previous and expected migration;
5. The extent to which the amount of water available for beneficial use will be preserved by a particular type of remedial action;
6. The technical practicality and cost-effectiveness of alternative remedial actions applicable to the site; and,
7. The availability of other appropriate federal or state remedial action and enforcement mechanisms, including, to the extent consistent with this article, funding sources established under CERCLA, to respond to the release.

4.2 REMEDIAL OBJECTIVES AT THE WVBA WQARF SITE

ROs are goals to be achieved by the selected remedy under an approved remedial action plan. Final ROs for the WVBA WQARF Site are provided in Appendix AA of the *Final WVBA RI Report* for land use, groundwater use (municipal, agricultural, and commercial, industrial, and domestic uses considered separately), and surface water use. The reference remedy and alternative remedies evaluated for the *RID FS Report* and this *PRAP* "shall be capable of achieving all of the remedial objectives,"[65] which have been established as follows.

4.2.1 REMEDIAL OBJECTIVES FOR LAND USE

Although this *PRAP*, consistent with the *RID FS Report*, does not specifically include source control actions associated with surface and subsurface soils in developing remedial alternatives for the regional groundwater remedy, the ROs for current and reasonably foreseeable land uses are included for completeness and are as follows:

- Protect against possible exposure to hazardous substances in surface and subsurface soils that could occur during development of property based upon applicable zoning regulations.
- Protect against possible leaching of hazardous substances in surface and subsurface soils to the groundwater.
- Protect against the loss or impairment of current and all reasonably foreseeable future uses of land as provided in zoning regulations and the Land and Water Use report as a result of hazardous substances in surface and subsurface soils. Appropriate remedial actions will be implemented as an ERA or after the Record of Decision (ROD) is finalized

[65] AAC R18-16-407.E.1.

whichever is warranted and continued until hazardous substances causing the impairment or restriction to the land use are remediated.

4.2.2 REMEDIAL OBJECTIVES FOR GROUNDWATER USE

ROs for groundwater use are divided into three subsets: Municipal, Agricultural and Commercial/Industrial/Domestic. Each of these groundwater use classifications is addressed in the following sections.

Municipal Groundwater Use - Based upon review of public comments, which identified water quality degradation and the potential establishment of more stringent MCLs, ADEQ's ROs for Municipal Groundwater Use are the following:

- To protect, restore, replace or otherwise provide a water supply for municipal use by currently and reasonably foreseeable future municipal well owners within the WVBA WQARF Site if the current and reasonably foreseeable future uses are impaired or lost due to contamination from the Site. Remedial actions will be in place for as long as need for water exists, the resource remains available and the contamination associated with the WVBA WQARF Site prohibits or limits groundwater use. Remedial actions to meet ROs will be implemented upon issuance of the ROD. If there is an imminent risk to human health or the environment, then an ERA may be initiated prior to implementation of the ROD.
- To protect, restore, replace or otherwise provide a water supply for municipal groundwater use by currently and reasonably foreseeable future municipal well owners outside the current plume boundaries of the WVBA WQARF site if the current and reasonably foreseeable future uses are impaired or lost due to contamination from the Site. Remedial actions will be in place for as long as need for the water exists, the resource remains available and the contamination associated with the WVBA WQARF Site prohibits or limits groundwater use. Remedial actions to meet ROs will be implemented upon issuance of the ROD. If there is an imminent risk to human health or the environment, then an ERA may be initiated prior to implementation of the ROD.

Agricultural Groundwater Use - Based upon review of public comments, ADEQ's ROs for Agricultural Groundwater Use are as follows:

- To protect, restore, replace or otherwise provide for the current and reasonably foreseeable future supply of groundwater for agricultural/irrigation use and for the associated recharge capacity that is threatened by or lost due to contamination associated with the WVBA WQARF Site. Remedial actions will be in place for as long as the need for water exists, the resource remains available and the contamination associated with the WVBA WQARF Site prohibits or limits groundwater use. Remedial actions to meet ROs will be implemented upon issuance of the ROD. If there is an

imminent risk to human health or the environment, then an ERA may be initiated prior to implementation of the ROD.

Commercial/Industrial/Domestic Groundwater Use - Based upon review of public comments, ADEQ's ROs for Commercial, Industrial, and Domestic Groundwater Use are as follows:

- To protect, restore, replace or otherwise provide a water supply for potable or non-potable use by currently impacted commercial, industrial, and domestic well owners within the WVBA WQARF Site if the current and reasonably foreseeable future uses are impaired or lost due to contamination from the Site. Remedial actions will be in place for as long as the need for water exists, the resource remains available and the contamination associated with the WVBA WQARF Site prohibits or limits groundwater use. Remedial actions to meet ROs will be implemented upon issuance of the ROD. If there is imminent risk to human health or the environment, then an ERA may be initiated prior to implementation of the ROD.
- To protect, restore, replace or otherwise provide a water supply for potable or non-potable use by commercial, industrial, and domestic well owners outside the current plume boundaries of the WVBA WQARF Site if the current and reasonably foreseeable future uses are impaired or lost due to contamination from the Site. Remedial actions will be in place for as long as the need for the water exists, the resource remains available and the contamination associated with the WVBA WQARF Site prohibits or limits groundwater use. Remedial actions to meet ROs will be implemented upon issuance of the ROD. If there is an imminent risk to human health or the environment, then an ERA may be initiated prior to implementation of the ROD.

4.2.3 REMEDIAL OBJECTIVES FOR CANAL/SURFACE WATER USE

ROs for surface water use are divided into two subsets: RID Canal Water Use and SRP Canal Water Use. Both of these surface water uses are addressed in the following sections.

RID Canal Water Use - Based upon review of public comments, ADEQ's ROs for RID Canal Water Use are as follows:

- To protect, restore, replace or otherwise provide a water supply for potable or non-potable use by currently impacted RID wells within the WVBA WQARF Site if the current and reasonably foreseeable future uses are impaired or lost due to contamination from the Site. Remedial actions will be in place for as long as the need for water exists, the resource remains available and the contamination associated with the WVBA WQARF Site prohibits or limits groundwater use. Remedial actions to meet ROs will be implemented upon issuance of the ROD. If there is an imminent risk to human health or the environment, then an ERA may be initiated prior to implementation of the ROD.

- To protect, restore, replace or otherwise provide a water supply for potable or non-potable use by RID wells outside the current plume boundaries of the WVBA WQARF Site if the current and reasonably foreseeable future uses are impaired or lost due to contamination from the Site. Remedial actions will be in place for as long as the need for water exists, the resource remains available and the contamination associated with the WVBA WQARF Site prohibits or limits groundwater use. Remedial actions to meet ROs will be implemented upon issuance of the ROD. If there is an imminent risk to human health or the environment, then an ERA may be initiated prior to implementation of the ROD.

SRP Canal Water Use - Based upon review of public comments, ADEQ's ROs for SRP Canal Water Use are as follows:

- To protect, restore, replace or otherwise provide a water supply for potable or non-potable use by SRP wells outside the current plume boundaries of the WVBA WQARF Site if the current and reasonably foreseeable future uses are impaired or lost due to contamination from the Site. Remedial actions will be in place for as long as the need for water exists, the resource remains available and the contamination associated with the WVBA WQARF Site prohibits or limits groundwater use. Remedial actions to meet ROs will be implemented upon issuance of the ROD. If there is an imminent risk to human health or the environment, then an ERA may be initiated prior to implementation of the ROD.

4.3 REMEDIAL OBJECTIVES AT ADJACENT SITES

The ROs for CERCLA and WQARF sites adjacent to the WVBA WQARF Site are provided in the following sections.

4.3.1 MOTOROLA 52ND STREET CERCLA SITE

The OU1 remedy was designed to meet the substantive requirements of applicable permits. Although not explicitly stated as a remedial action objective, the OU1 Letter of Determination indicates that, *"the intent of the interim remedy is to be part of a final remedy for the Site that will protect human health and the environment by containing the migration of high concentrations of VOCs in groundwater via extraction and treatment to a level commensurate with its use. These efforts would thus reduce the toxicity, mobility, or volume of contamination present at the Site"* (ADEQ, 2011b). The major components of the interim remedy selected include the following:

- Extraction and treatment of groundwater from the Courtyard/50th Street area at the M52 Facility;

- Extraction and treatment of vapor phase organic contaminants from soils at the Courtyard/50th Street, the Acid Treatment Plant, and the Southwest Parking Lot areas of the M52 Facility;
- Extraction of groundwater designed to contain contaminant migration in alluvium groundwater (east of) at the Old Crosscut Canal;
- Treatment at the M52 Facility of groundwater extracted from the Old Crosscut Canal containment system; and
- Use of all treated groundwater at the M52 Facility to replace water currently purchased from the COP.

The primary ROs of the M52 OU2 area are to establish a capture zone across the entire north-south width and depth of the contaminant plume and to reduce contaminant concentrations within the alluvial aquifer upgradient of the extraction wells. The major components of the selected remedy, as modified by the *Explanation of Significant Differences* (EPA, 1999) dated September 1999, are:

- Installation of wells and extraction of groundwater in the vicinity of Interstate 10 and Van Buren Street;
- Treatment of extracted groundwater to drinking water quality standards using carbon adsorption and ultraviolet oxidation at a treatment plant located near extraction wells; and,
- Discharge of treated water to the SRP Grand Canal for agricultural irrigation and livestock watering.

No ROs have been established for the OU3 Study Area as RI activities are currently being conducted in the OUS Study Area.

4.3.2 WEST OSBORN COMPLEX WQARF SITE

The ROs for the WCP-WOC Site were formalized in the *Remedial Objectives Report*, prepared by ADEQ, and dated May 2005 (ADEQ, 2005). The RO Report for the WOC Site indicated that ROs are not needed for land use. Current and/or potential groundwater uses that were identified within the WOC Site include: 1) the current and future use of groundwater for drinking water purposes by the COP; and, 2) the current and future use of SRP wells for municipal and irrigation use.

COP Municipal Use - The RO for the COP current municipal use is:

- To restore, replace, or otherwise provide for the COP groundwater supply that has currently been lost due to PCE and/or TCE contamination associated with the Site. This action is needed as soon as possible. This action is needed for as long as the need for

the water exists, the resource remains available, and PCE and/or TCE concentrations in the water prohibit or limit its use.

The RO for the COP future municipal supply use is:

- To protect for the use of the COP municipal groundwater supply threatened by the PCE and/or TCE contamination emanating from the Site. According to the COP, this use may be the year 2010. This action would be needed for as long as the level of contamination in the identified groundwater resource threatens or prohibits its use.

SRP Municipal and Irrigation Use - The RO for the SRP current and future municipal and irrigation use of the wells is:

- To protect for the use of the SRP groundwater supply threatened by the PCE and/or TCE contamination emanating from the Site. According to SRP, this use may be needed as soon as is technically feasible. This action would be needed for as long as the level of contamination in the identified groundwater resource threatens or prohibits use.

4.3.3 56TH STREET AND EARLL DRIVE WQARF SITE

The major components of the early response action are:

- Installation of wells and extraction of groundwater located along the bank of the Grand Canal to the east of 32nd Street;
- Treatment of extracted groundwater to drinking water quality standards using carbon adsorption; and;
- Discharge of treated water to the SRP Grand Canal for agricultural irrigation.

4.4 EXTENT OF IMPACTS TO AREA WATER PROVIDERS

There are five (5) major water providers with water supply wells in the WVBA vicinity: RID, SRP, APS, and the Cities of Phoenix and Tolleson. Of these providers, the only operating water supply wells currently impacted by target COCs at concentrations above applicable AWQSs and MCLs belong to RID. Data reported in the *RID FS Report* indicate RID has 33 operating water supply wells in the WVBA WQARF Site vicinity of which 24 are actually impacted by COCs, thirteen (13) of these impacted wells exceed AWQSs and MCLs for one or more of the target COCs, while the other eleven (11) impacted RID wells currently exhibit concentrations of the target COCs below AWQSs and MCLs. The remaining nine (9) RID water supply wells are potentially threatened[66] by WVBA WQARF Site contamination.

[66] For the purposes of identifying wells "threatened" by groundwater contamination, the FS Report and this PRAP utilized the convention defined in AAC R-18-16-405(I) that considers a well located in the area within one-quarter mile upgradient, one-half mile cross-gradient, or one mile downgradient of the areal extent of contamination at the Site as presumed to be threatened by the contamination.

The impact to other water providers is currently limited. COP has two (2) shallow Parks Department wells within the WVBA WQARF Site that have been disconnected from use since the mid-1990s. All other COP wells are outside the WVBA WQARF Site and not currently threatened by WVBA WQARF Site groundwater contamination.[67]

Water supply wells operated by APS, SRP, and Tolleson that are within or downgradient of the WVBA WQARF Site are potentially threatened or currently are nominally impacted by the WVBA WQARF Site groundwater contamination; however, the extent to which the wells may be impacted will depend on the actions decided for the WVBA WQARF Site regional groundwater remedy. In this regard, certain SRP and COT wells downgradient of the WVBA WQARF Site groundwater contaminant plume have historically had low levels of detectable COC concentrations. As indicated in the plume map shown in **Figure 2**, these wells are presently outside of the estimated extent of contamination defined by the 5 µg/L AWQS plume boundary for TCE and PCE. To prevent future impacts to downgradient SRP and COT wells, the WVBA WQARF Site proposed regional groundwater remedy will require sufficient, sustained groundwater extraction from the contaminated UAU aquifer within the WVBA WQARF Site to hydraulically contain the plume and prevent westward contaminant migration beyond its current limit.

APS has production wells within the WVBA WQARF Site, but they produce water from the LAU only. The WVBA Final RI Report indicates that the LAU does not appear to be contaminated within the WVBA WQARF Site. To limit future impacts to deep APS wells, it will be important to monitor vertical gradients and the potential for downward groundwater flow and address any conditions that could lead to vertical cross contamination of aquifers.

In consideration of potential future groundwater use in this region, the COP had indicated its need to assure groundwater resources are available to augment City drinking water supplies to reduce drought impacts. In both the COP's response to ADEQ's Land and Water Use Survey for the WVBA WQARF Site and its suggested ROs for the Site,[68] COP emphasized future drinking water supply usage of the groundwater in the WVBA WQARF Site. However, there is no reasonable prospect of the City installing shallow wells within the WVBA WQARF Site in the near future due to the fact that the City has long-standing policies[69] that discourage or outright prohibit the introduction of contaminated groundwater through a treatment plant directly into the City distribution system. Moreover, as is the case in the planning for the new Western

[67] At least two (2) COP wells are impacted by the contaminant plume in the WOC Site to the north of the WVBA WQARF Site, but the planned WOC Site selected groundwater remedy addresses these wells.
[68] COP *Land and Water Use Questionnaire* completed by Donn Stoltzfus, Manager, COP Environmental Program Specialist (September 21, 2007) and letter from Philip McNeeley, Manager COP Environmental Programs to Julie Riemenschneider, Manager, ADEQ Remedial Projects Section. (January 7, 2010)
[69] The reference to City policies on remediated water use is based on information COP provided in **Appendix E** of the *RID FS Report*.

Canal Well Field,[70] COP would be expected, at least in the near future, to construct any new water supply wells exclusively in the LAU to target better inorganic water quality.

SRP also has expressed an interest in developing water supply resources in the area to augment drinking water supplies for its shareholders. Similar to the COP and RID, SRP has emphasized future drinking water supply usage of groundwater in the WVBA WQARF Site and further indicates the plan to provide SRP wells for use by the COP.[71] Again, it is not reasonable to assume that SRP would consider or plan new shallow wells within the WVBA WQARF Site since SRP already has a number of underutilized wells throughout west Phoenix and Tolleson. These wells are outside the WVBA WQARF Site and could be connected for City use. More importantly, use of these outlying wells would not conflict with COP policies that prohibit the use of treated groundwater from a contaminated site.

In sum, the WVBA WQARF Site regional groundwater remedy must, consistent with ARS § 49-282.06.B.4.b., protect all existing water supply wells that are not fit for their current or reasonably foreseeable water end uses over at least the next 100 years,[72] as well as the needs of the water providers to assure their water supply in their wells is not diminished in quality, quantity, and/or reliability by implementation of any remedial strategies or measures. Groundwater alternative remedies have been developed pursuant to the *RID FS Report* to address the impacted and threatened water provider wells, as required by the ROs and ARS §§ 49-282.06.A. and 49-282.06.B.4.b.

[70] *See* discussion on COP water infrastructure in Section 4.6.3 of the *RID FS Report*.
[71] *See* SRP *Land and Water Use Questionnaire* completed by Daniel Casiaro, Manager, SRP Environmental Compliance (September 21, 2007)..
[72] *See* AAC R18-16-406.D.

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5.0 NEED FOR REMEDIAL ACTION

Information from the *Final WVBA RI Report* indicates that VOCs are prevalent in groundwater throughout a large portion of the WVBA WQARF Site. The data indicate widespread VOC contamination within the UAU and, to a significantly lesser degree, the MAU by TCE, PCE, 1,1-DCE, and other compounds that may be breakdown products. Three (3) target COCs (TCE, PCE and 1,1-DCE) are present in groundwater within the WVBA WQARF Site at concentrations that exceed the applicable numeric and narrative AWQSs[73] and MCLs.[74] Terranext (2012) indicates that PCE is the predominant COC for the WVBA WQARF Site. Although this may be true in terms of the magnitude of contamination detected historically within the WVBA WQARF Site, at present TCE occurs as prevalently, if not more so, than PCE. In fact based on data reported in the first quarter 2013 (Terranext, 2013) and provided in **Table 1**, 52 of the 94 UAU monitor wells sampled have detectable PCE concentrations while 56 of the 94 UAU monitor wells sampled have detectable TCE levels. The maximum PCE concentration measured at this time was 87.5 μg/L at well AVB 119-01, whereas the maximum TCE concentration was 177 μg/L at well AVB 132-01.

Accordingly and as described in the *RID FS Report*, the WVBA WQARF Site regional groundwater remedy must, consistent with the applicable numeric and narrative aquifer water quality standards[75] and the applicable remedial action criteria in ARS § 49-282.06.A requiring "protection of public health, welfare and the environment" and the "control, management or cleanup of the hazardous substances in order to allow the maximum beneficial use of the waters of the state," achieve containment of the VOC-contamination to protect the groundwater from further degradation, remediate the contaminant groundwater to achieve applicable aquifer water quality standards for the target VOCs in waters of the state, address the uncontrolled emissions of hazardous VOCs into the local community, and treat the extracted contaminated groundwater to maximize the beneficial end use of the contaminated groundwater to meet the reasonably foreseeable end use of the WVBA aquifer.

Additionally and as noted in the previous section, there are five (5) major water providers with water supply wells in the WVBA vicinity: RID, SRP, APS, and the Cities of Phoenix and Tolleson.

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[73] Arizona has established enforceable numeric AWQSs based upon EPA's primary drinking water quality MCL standards because all aquifers in Arizona are classified for drinking water protected use. *See* ARS § 49-224.B., ARS § 49-223.A., and AAC R18-11-406. In addition to the enforceable numeric AWQSs, Arizona has established the following enforceable narrative AWQSs: a discharge shall not cause a pollutant to be present in an aquifer classified for a drinking water protected use in a concentration which endangers human health; a discharge shall not cause or contribute to a violation of a water quality standard established for a navigable water of the state; and a discharge shall not cause a pollutant to be present in an aquifer which impairs existing or reasonably foreseeable uses of water in an aquifer. *See* ARS § 49-221.D. and AAC R18-11-405.

[74] EPA has established primary MCLs as enforceable drinking water standards determined by balancing the adverse health effects of a particular chemical against the feasibility and cost of treating contaminated water. Arizona has adopted EPA's primary MCLs as enforceable state drinking water quality standards. *See* AAC R18-4-104.

[75] ARS § 49-221.A and D, 49-223.A, 49-224.B, AAC R18-11-405 and 406.

Of these providers, the only operating water supply wells currently impacted by target COCs at concentrations above applicable AWQSs and MCLs belong to RID. Data reported in the *RID FS Report* indicate RID has 33 operating water supply wells in the WVBA WQARF Site vicinity of which 24 are actually impacted by COCs, thirteen (13) of these impacted wells exceed AWQSs and MCLs for one or more of the target COCs (maximum concentration of 22.1 μg/L for PCE at well RID-106 and 86.4 μg/L for TCE at well RID-92), while the other eleven (11) impacted RID wells currently exhibit concentrations of the target COCs below AWQSs and MCLs. The remaining nine (9) RID water supply wells are potentially threatened[76] by WVBA WQARF Site contamination.

As discussed earlier, other water providers either are not impacted by the contamination (wells outside the WVBA boundary or deep wells limited to the non-contaminated LAU) or are threatened to exceed AWQSs and MCLs if the contamination is not sufficiently contained. To limit future impacts to deep wells, it will be important to monitor vertical gradients and the potential for downward groundwater flow and address any conditions that could lead to vertical cross contamination of aquifers. To prevent future impacts to downgradient wells, the WVBA WQARF Site proposed regional groundwater remedy will require sufficient, sustained groundwater extraction from the contaminated UAU aquifer within the WVBA WQARF Site to hydraulically contain the plume and prevent westward contaminant migration beyond its current limit.

Accordingly, the WVBA WQARF Site regional groundwater remedy also must, consistent with ARS § 49-282.06.B.4.b., protect all existing water supply wells that are not fit for their current or reasonably foreseeable water end uses over at least the next 100 years,[77] as well as the needs of the water providers to assure their water supply in their wells is not diminished in quality, quantity, and/or reliability by implementation of any remedial strategies or measures.[78] Groundwater alternative remedies in the FS Report were developed to address the impacted and threatened water provider wells, as required by the ROs and ARS §§ 49-282.06.A. and 49-282.06.B.4.b.

[76] *See* footnote 66.
[77] *See* AAC R18-16-406.D.
[78] AAC R18-16-407.G.

6.0 SUMMARY OF REMEDIAL STRATEGIES AND REMEDIAL MEASURES IN RID FS REPORT

The *RID FS Report* presented the evaluation process used in developing and selecting remedial technologies, remedial measures, prescribed remedial strategies and discharge considerations. Pursuant to ARS § 49-287.03, the "feasibility study shall … include an alternative screening step to select a reasonable number of alternatives in a manner consistent with the rules and procedures adopted pursuant to section 49-282.06." Consistent with ARS § 49-282.06.B.4., ADEQ's "rules shall provide for the selection of a remedial action by comparison of alternative remedial actions, which may include no action, monitoring, source control, controlled migration, physical containment, [and] plume remediation." Furthermore, ARS § 49-282.06.B.4 requires that "the selected remedial action meet the requirements of [ARS § 49.282.06.A.] and [ARS § 49-282.06.B.4.b.] for remediation of waters of the state." These mandated statutory requirements for a selected remedial action include:

1. Assure the protection of public health and welfare and the environment;
2. To the extent practicable, provide for the control, management and cleanup of the hazardous substances in order to allow for the maximum beneficial use of the waters of the state;
3. Be reasonable, necessary, cost effective and technically feasible; and,
4. Address, at a minimum, any well that at the time of selection of the remedial action either supplies water for municipal, domestic, industrial, irrigation or agricultural uses or is part of a public water system if the well would now or in the reasonably foreseeable future produce water that would not be fit for its current or reasonably foreseeable use without treatment due to the release of hazardous substances.

According to the rules adopted pursuant to ARS § 49-282.06, AAC R18-16-407.E.1 requires that the reference remedy and each alternative remedy shall consist of a remedial strategy and specify all remedial measures to be employed. Importantly, the combination of the remedial strategy and the remedial measures for each alternative also must achieve all the ROs (as described in Section 4).[79] Furthermore, pursuant to ARS § 49-282.06.B.4.b., the "specific measures to address any such well [protected by ARS § 49-282.06.B.4.b.] shall not reduce the supply of water available to the owner of the well."

The reference remedy and alternative remedies also may incorporate different strategies for different aquifers or portions of aquifers and also may include contingent remedial strategies or measures to address reasonable uncertainties regarding achievement of ROs or uncertainty in the time-frames in which the ROs are expected to be achieved.[80]

[79] AAC R18-16-407.E.1
[80] *Ibid.*

Based on this process, a Reference Remedy was developed along with three alternative remedies referred to as a Less Aggressive Remedy, More Aggressive Remedy and Most Aggressive Remedy for comparison in the FS Report. The Reference Remedy and each alternative remedy consist of a remedial strategies and measures to achieve the cleanup goals specified in Section 4.1 that includes the statutory remedial requirements and the ROs established by ADEQ for the WVBA WQARF Site.

6.1 REMEDIAL STRATEGIES

As provided in A.A.C. Rl8-16-407(F), remedial strategies that were considered when developing the Reference Remedy and each alternative remedy included one or more of the following:

- Plume remediation to achieve applicable water-quality standards for COCs in waters of the state throughout the Site;
- Physical containment to contain contaminants within definite boundaries;
- Controlled migration to control the direction or rate of migration, but not necessarily to contain migration of contaminants;
- Source control to eliminate or mitigate a continuing source of contamination;
- Monitoring to observe and evaluate the contamination at the Site through the collection of data; and
- No action.

Remedial strategies form the framework of the possible remedies and, by incorporating remedial measures, define the detailed approach for implementing the selected remedy. Therefore, in determining which strategies are suitable for achieving a compliant regional groundwater remedy at the WVBA WQARF Site, each strategy was considered in the context of whether the strategy is capable of achieving the legal requirements. The screening and suitability of each of these remedial strategies is discussed in Section 5 of the *RID FS Report* and those strategies incorporated in the Reference Remedy and each alternative remedy are summarized in Section 7 of the *RID FS Report*.

As noted in the *RID FS Report*, source control is not applicable and, therefore, not explicitly included in the reference or alternative remedies on the belief, as stated in the *FS Work Plan* (Synergy, 2013c), that actions taken to date under ADEQ oversight[81] have adequately characterized and addressed the known sources of hazardous substances that may be impacting groundwater. Although these historical source control activities were not featured in the *RID FS Report*, the actions have beneficially lessened COC mass loading[82] to UAU

[81] According to Section 4.2 of the *Final WVBA RI Report*, there have been source investigations at nearly 50 facilities within and adjacent to the WVBA WQARF Site.
[82] For example, source control at the ALSCo and Dolphin facilities appears to have significantly reduced PCE

groundwater by removing continuing sources of groundwater contamination. Should any further information arise that identifies the need to address a known source or a presently undefined source of hazardous substances, it is assumed that ADEQ will, independent of the groundwater remedy, assure that necessary actions are taken to remediate or control the hazardous substances causing the impairment or restriction to groundwater use.

6.2 REMEDIAL MEASURES

In developing alternative remedies, all necessary remedial measures must "achieve remedial objectives [and] satisfy the requirements of ARS § 49-282.B.4.b."[83] The remedial measures "shall be identified in consultation with water providers or known well owners whose water supplies are affected by the release or threatened release of a hazardous substance." Remedial measures, as discussed in AAC R18-16-407.G, may include but are not limited to:

- Well Replacement
- Well Modification
- Water Treatment
- Provision of Replacement Water Supplies
- Engineering Controls

Each of these remedial measures is discussed in more detail in the following sections along with their suitability for continued consideration given the unique WVBA WQARF Site characteristics and the applicable statutory and regulatory requirements. Specifically, each remedial measure must meet all the ROs established by ADEQ for the WVBA WQARF Site, satisfy the requirements of ARS § 49-282.06.B.4.b. and consider the needs of affected water providers and known well owners, including:

1. Quantity and quality of water;
2. Water rights and other legal constraints on water supplies;
3. Reliability of water supplies; and,
4. Operational implications.

The screening and suitability of each of these remedial measures is discussed in Section 5 of the *RID FS Report* and those measures incorporated in the Reference Remedy and each alternative remedy are summarized in Section 7 of the *RID FS Report*. The Reference Remedy and each alternative remedy also include, if necessary, contingent remedial strategies or remedial measures to address reasonable uncertainties regarding the achievement of cleanup goals, or uncertain time frames in which cleanup goals will be achieved.

concentrations from potential DNAPL sources, as discussed in Section 3.
[83] AAC R18-16-407.G

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7.0 SUMMARY OF GROUNDWATER REMEDIES EVALUATED IN RID FS REPORT

Four (4) groundwater alternative remedies were fully described and evaluated in Section 7 and 8 of the *RID FS Report* as a potential regional groundwater remedy for the WVBA WQARF Site, and in simplest terms, the main elements consist of:

7.1 REFERENCE REMEDY

Installing wellhead treatment at nine (9) impacted wells, extracting and treating the contaminated groundwater from those wells and blending of four (4) other impacted wells that would be operated to achieve both applicable AWQSs and MCL water quality for all current and reasonably foreseeable water end uses at all wells of the existing water providers within or adjacent to the WVBA WQARF Site. Two (2) replacement wells would be drilled to enhance hydraulic capture in critical areas of plume containment and to restore any reduction in the available supply of water caused by addressing impacted wells.

7.2 LESS AGGRESSIVE ALTERNATIVE REMEDY

Reducing the scale of the Reference Remedy by installing wellhead treatment at six (6) impacted wells, extracting and treating the contaminated groundwater and blending of six (6) other impacted wells to achieve both applicable AWQSs and MCL water quality for all current and reasonably foreseeable water end uses at all wells of the existing water providers within or adjacent to the WVBA WQARF Site. Only one (1) replacement well would be drilled to address and achieve both applicable AWQSs and MCL water quality for all current and reasonably foreseeable water end uses at one (1) other impacted well, as well as to enhance hydraulic capture in critical areas of plume containment and to restore any reduction in the available supply of water caused by addressing impacted wells.

7.3 MORE AGGRESSIVE ALTERNATIVE REMEDY

All elements of the Less Aggressive Remedy plus proposed modifications at five (5) wells in peripheral areas most threatened by the WVBA WQARF Site plume to reconfigure the wells for injection of underutilized effluent that is available during low irrigation demand periods.

7.4 MOST AGGRESSIVE ALTERNATIVE REMEDY

Installing wellhead treatment and extracting and treating contaminated groundwater at all 13 impacted wells that exceed AWQSs and MCLs for the VOC groundwater contaminants.

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8.0 EVALUATION OF ALTERNATIVE REMEDIES IN RID FS REPORT

In the *RID FS Report*, the Reference Remedy and alternative remedies[84] were compared to determine which remedy should be proposed as the regional groundwater remedy and subjected to the regulatory process described in A.A.C. R18-16-408 (Proposed Remedial Action Plan). Therefore, the four (4) remedies described in Section 7 were evaluated in the *RID FS Report* using the comparison criteria described in the following section to enable detailed and methodical consideration of each remedial alternative.

8.1 EVALUATION CRITERIA

In accordance with the remedy selection process described in A.A.C. R18-16-407, the *RID FS Report* was conducted to ensure achievement of all the WVBA WQARF Site groundwater ROs and to satisfy the requirements of ARS § 49-282.06, including specifically ARS § 49-262.06.B.4.b. During the FS, the possible remedies were developed with consideration of the water resource needs of the water providers within WVBA WQARF Site and specifically formulated to best address the impacts and threats to the wells and water supply of said water providers consistent with applicable groundwater remedial action requirements under the Arizona WQARF program. The *RID FS Report* included a detailed comparative evaluation of the Reference Remedy and alternative remedies. For each alternative, the comparison included a demonstration that all the WVBA WQARF Site groundwater ROs will be achieved, an evaluation of consistency with the water management plans of affected water providers and an evaluation of the practicality, risk, cost and benefit/value analysis as set forth in AAC R18-16-407.H.3.

8.1.1 ACHIEVEMENT OF ALL REMEDIAL OBJECTIVES (ROs):

As noted, the scope of the *RID FS Report* and this *PRAP* is to identify possible regional groundwater remedies to address the target COCs in groundwater within the WVBA WQARF Site, which also has been commingled with target COCs from adjacent regional groundwater contaminant sites. Consequently, the *RID FS Report* and this *PRAP* are focused on groundwater contamination and addressing the impacts to water providers as defined in Section 4.4 (Extent of Impact to Area Water Providers) and protecting, at a minimum, all "current and reasonably foreseeable water end uses" as defined in the WVBA WQARF Site RO Report.[85] As shown in **Table 6**, all identified groundwater remedial alternatives meet essential WQARF requirements established to assure the proposed regional groundwater remedy, at a minimum, meets all ROs for "current and reasonably foreseeable water end uses" within and outside the WVBA WQARF Site.

[84] Throughout this section, the Reference Remedy and alternative remedies will be referred to as an "alternative remedy."
[85] *See* ARS § 49-282.06.B.4.b.

The detailed analysis provided for each groundwater alternative remedy described in Section 7 of the *RID FS Report* identified the specific remedial measures, including proposed actions that would be taken to treat, replace or otherwise modify water provider wells, to assure all ROs are achieved. The proposed actions of each alternative will assure that all impacted water provider wells, principally RID wells, which are not suitable for current or reasonably foreseeable water end uses without treatment are adequately addressed. Where information is uncertain, such as the current situation affecting the inactive COP wells, potential requirements to address the wells are identified as a contingency. Importantly, the proposed actions to address impacted wells within the WVBA WQARF Site contaminant plume will ensure that water provider wells downgradient from or peripheral to the plume that are less impacted or threatened by the contamination are protected for their "current and reasonably foreseeable water end uses."

With regard to WVBA WQARF Site ROs associated with land use and impacts, numerous facility investigations have been conducted throughout the WVBA WQARF Site over the past 25 years to characterize and remediate the impacts of hazardous substance releases. The scope of the *RID FS Report* and this *PRAP*, which addresses a regional groundwater remedy, does not include past or future work to address soil contamination at sources areas, nor the impacts, if any, on the loss or impairment to land uses. Instead, the FS assumed, as does this *PRAP*, that the actions taken under ADEQ oversight have adequately addressed the known sources of hazardous substances impacting surface and subsurface soils and the potential this may have to cause a loss or impairment of land use. Further, should any additional information arise that identifies the need to address a presently unknown source of hazardous substances in surface or subsurface soil, it is assumed that ADEQ will assure that actions taken will not adversely impact or impair land uses in the WVBA WQARF Site.

8.1.2 CONSISTENCY WITH WATER AND LAND USE PLANS

As discussed above and shown in **Table 6**, all identified groundwater remedial alternatives meet all essential WQARF requirements that have been established to assure the proposed regional groundwater remedy meets the water management needs of affected water providers. Specifically, as it pertains to RID, the identified remedial alternatives evaluated in the *RID FS Report* and discussed in this *PRAP* are consistent with established RID policy to assure: 1) all wells located in the WVBA WQARF Site that are contaminated with hazardous substances are remediated to mitigate the actual and/or potential harm to public health, welfare, and the environment, 2) discharges or delivery of remediated water into the RID water distribution system meet MCLs and AWQSs for the COCs, and 3) response actions developed to protect RID wells provide for the maximum beneficial use of the water supply and do not reduce the quantity of water available to RID.

The groundwater remedial alternatives evaluated in the *RID FS Report* and described in this *PRAP* also were developed in consideration of the stated water management plans, policies,

and future needs of COP and SRP, as documented in Section 4. In particular, as expressed in suggested ROs by COP (2010a), the objective of the groundwater remedy "*should be for the long-term groundwater use*" and "*where treatment is necessary to protect future long-term groundwater use, the remedy should include measures to provide for the long-term operation and maintenance of reliable and cost-effective water treatment technologies.*" The City further noted, "*[a]s an interim measure, the water produced from the contaminated area during remediation that is intended for irrigation or non-potable uses, should be applied, or if necessary, treated appropriately to prevent a health risk to the end users or others with an exposure pathway to the water.*" Although there are currently limited impacts to these water providers, all the groundwater remedial alternatives evaluated in the *RID FS Report* and described in this *PRAP* will ensure that COP, SRP, and other water provider wells that are threatened by the contamination are protected for their "current and reasonably foreseeable water end uses."

With regard to land use plans, the scope of the *RID FS Report* and this *PRAP*, which addresses a regional groundwater remedy for the WVBA WQARF Site, was anticipated to have relatively limited impacts to land use. In general, land use impacts are primarily associated with site improvements proposed at RID well sites and along RID conveyance canals on land owned by RID or within established RID easements and rights-of-way. As a municipal corporation, RID is not subject to City requirements that typically apply to privately owned properties, such as zoning, use permits, plan reviews, and inspections. In implementing the selected remedy, RID is the best party to assure the remedial measures do not excessively impair land use and will lead the design and construction effort of the selected regional groundwater remedy to appropriately manage the impact to RID lands and easements.

Remedial measures identified for all four (4) of the groundwater remedial alternatives involve a select number of new wellhead treatment systems where it will be necessary to acquire land to build out the remedy components. Installation of liquid phase granular activated carbon (LGAC) treatment systems will impact land use in vicinity of these wells. Review of aerial photographs of the well sites targeted for treatment indicates there is generally vacant or undeveloped land adjacent to these wells, the surrounding land use is commercial and industrial, and the planned remedial measures are consistent with existing land uses.

8.1.3 PRACTICABILITY

Each of the four (4) groundwater alternative remedies presented and evaluated in the *RID FS Report* and described in this *PRAP* is considered to be technically feasible and operationally practicable. While all alternatives are generally practicable, they each involve differing levels of added infrastructure, as shown below, which differentiates them based on the associated level of effort of implementation.

	Number of Existing Treatment Skids[86]	Number of New Treatment Skids	Number of Replacement Wells	Number of Existing Wells Reconfigured as ASR Wells
Reference Remedy	9	12	2	0
Less Aggressive	9	5	1	0
More Aggressive	9	5	1	5
Most Aggressive	9	22	2	0

ASR = Aquifer Storage and Recovery

From an ease of implementation standpoint, the Less Aggressive groundwater alternative remedy is a significantly more viable option than the other groundwater alternative remedies in that it requires the installation of only two (2) additional wellhead treatment systems (a total of five [5] new treatment skids) and a single replacement well. The Reference Remedy and More Aggressive groundwater alternative remedy are considered more challenging in implementation, primarily due to the added water treatment infrastructure and corresponding need to expand access and acquire land to facilitate the proposed remedial measures. The Most Aggressive groundwater alternative remedy is the least practicable of the groundwater alternative remedies evaluated due to the substantially greater requirements associated with access and land acquisition for installation of water treatment systems at nine (9) additional well sites.

8.1.4 RISK

All of the four (4) groundwater alternative remedies presented and evaluated in the *RID FS Report* and described in this *PRAP* reduce the risk of imminent and substantial endangerment to public health and welfare by substantially reducing uncontrolled releases of hazardous substances into the environment through the use of installed treatment systems. The Most Aggressive groundwater alternative remedy, however, provides the highest level of risk reduction compared to the other remedies since it includes wellhead treatment on the largest number of impacted wells (all 13 wells exceeding AWQSs/MCLs), would remove the largest amount of contaminants from the environment, and does not rely on blending to achieve MCLs.

The Reference Remedy consists of wellhead treatment on nine (9) wells and both the Less Aggressive and the More Aggressive groundwater alternative remedies consist of wellhead treatment on six (6) wells. The relative differences in risk reduction, however, are not proportional since the six (6) wellhead treatment systems conceived in the Less and More

[86] A treatment skid consists of two (2) GAC vessels and appurtenant piping that are operated in series to provide treatment of VOC-contaminated groundwater in a lead/lag configuration. Each of the treatment vessels contains a nominal 20,000 pounds of GAC.

Aggressive groundwater alternative remedies address the six (6) most highly contaminated wells in the WVBA WQARF Site and the additional wells treated in the Reference and Most Aggressive groundwater alternative remedies are considerably lower in contaminant concentration (as shown in **Table 2**).

In numerical terms, the amount of projected target COC mass removal associated with each of the proposed groundwater alternative remedies does not vary significantly, ranging from an estimated 77 to 91 percent of the total contaminant mass that is currently extracted by RID wells and released to the environment:

- the Reference Remedy removes **approximately 83% of the total mass of VOCs** estimated to be released into the environment each year;
- the Less Aggressive groundwater alternative remedy removes **approximately 77% of the total mass of VOCs** estimated to be released into the environment each year;
- the More Aggressive groundwater alternative remedy removes **approximately 77% of the total mass of VOCs** estimated to be released into the environment each year; and,
- the Most Aggressive groundwater alternative remedy removes **approximately 91% of the total mass of VOCs** estimated to be released into the environment each year.

In addition, each of the groundwater alternative remedies incorporates identical volatilization control measures to mitigate COC exposure pathways to the public. These measures include elimination of point source emissions at wellhead and lateral discharges. These measures also include enclosing the few remaining open sections of the RID-92 lateral and the Salt Canal. Consequently, the small mass of VOCs that are not removed by direct remedial measures will pose a reduced risk to the public.

8.1.5 COST

The estimated costs for the four (4) groundwater alternative remedies presented and evaluated in the *RID FS Report* and this *PRAP* are presented in **Table 4**. The Capital and O&M cost estimates, rounded to the nearest $100,000, are summarized as follows:

	Capital Expense	Annual O&M
Reference Remedy	$ 13,600,000	$ 3,000,000
Less Aggressive Alternative Remedy	**$ 9,400,000**	**$ 2,000,000**
More Aggressive Alternative Remedy	$ 14,600,000	$ 2,200,000
Most Aggressive Alternative Remedy	$ 19,500,000	$ 4,200,000

Projection of the 30-year and 50-year net present value costs (present worth) of the proposed groundwater alternative remedies are presented in **Table 5** and summarized below. These values (rounded to the nearest $100,000) assume that the capital and O&M costs indicated above would be incurred beginning in 2015 and annual cash flows for estimated O&M costs continue for the long-term future without adjustment for inflation. Periodic costs for equipment maintenance, repair, and/or replacement are accounted for as a recurring three (3) percent expense (based on equipment costs), included in the annual O&M cost roll-up.

	30-Year Present Worth	50-Year Present Worth
Reference Remedy	$ 73,300,000	$ 92,000,000
Less Aggressive Alternative Remedy	**$ 50,800,000**	**$ 63,800,000**
More Aggressive Alternative Remedy	$ 58,900,000	$ 72,700,000
Most Aggressive Alternative Remedy	$ 103,600,000	$ 130,000,000

The present worth calculations includes a three (3) percent discount rate applied to account for the time value of money. The use of this discount factor[87] is for comparative cost estimation purposes only and has not been analyzed in terms of whether this discount rate would satisfactorily establish the level of long-term funding necessary to cover the cost of future expenditures through established financial mechanisms such as a trust fund.

As evidenced by this cost summary, the Less Aggressive groundwater alternative remedy is considerably less expensive than the other groundwater alternative remedies in terms of capital expense, annual O&M and the resulting 30-year and 50-year present worth projections.[88] In comparison to remedial actions underway at other WQARF and CERCLA sites in Phoenix and Tucson, the Less Aggressive groundwater alternative remedy is particularly cost effective (**Table 7**).

[87] A three (3) percent discount rate was used in lieu of the higher rate (e.g. 7%) specified by EPA guidance document (EPA, 2000) to reflect the currently lower productivity costs of capital. The 3% rate reflects an estimate of the private sector cost of capital for which the inflation premium has been removed. In contrast, based on economic assumptions included in the 2015 Federal Budget, the US Office of Management and Budget (OMB) currently uses a 1.9% real discount rate for discounting long-term constant-dollar cash flows, as indicated in the Memorandum from the Director of OMB re: 2014 Discount Rates for OMB Circular No. A-94 dated February 7, 2014. (Burwel, 2014)

[88] For further comparative analysis, ADEQ recently estimated the Net Present Value of remedial action costs associated with the PRAP for the 7th Avenue and Bethany Home Road WQARF Site assuming a three (3) percent inflation rate and seven (7) percent discount factor to future costs. Using these input values, the 50-year Present Worth of capital and recurring O&M costs for the Less Aggressive groundwater alternative remedy is $51,467,800.

8.1.6 BENEFIT/VALUE

Each of the four (4) groundwater alternative remedies presented and evaluated in the *RID FS Report* and described in this *PRAP* benefits the environment through elimination of significant point source emissions due to volatilization and removal of significant amounts of hazardous substances from the groundwater, surface waters and air in the WVBA WQARF Site. Each groundwater alternative remedy also will provide the benefit to water providers within and adjacent to the WVBA WQARF Site (whose existing wells are impacted by groundwater contamination above AWQSs/MCLs) of remediating the impacted water to allow the "maximum beneficial use of the waters of the state"[89] as a source of drinking water, which is a "reasonably foreseeable water end use" for all existing wells within the WVBA WQARF Site,[90] while containment of the plume will ensure that any other less impacted or threatened wells of the water providers within and adjacent to the WVBA WQARF Site will produce water fit for their "current or reasonably foreseeable end uses" both now and in the reasonably foreseeable future.[91]

Compared to continuation of current RID operations, groundwater model projections indicate implementation of any of the groundwater remedial alternatives would result in localized and manageable changes in hydrologic conditions in the WVBA, but *would not cause significant additional water table decline or adverse movement of the WOC and M52 plumes*. These conclusions are consistent with the fundamental formulation criteria of the groundwater alternative remedies, which include reprioritized and increased pumping of key RID wells to enhance contaminant mass removal and hydraulic control of the plume where feasible, but do not include changes to the total amount of groundwater pumped by RID on an annual basis.

Although not significant at a regional scale, the reprioritized and increased pumping of RID wells associated with the groundwater alternative remedies are projected to locally improve hydraulic containment of the WVBA plume, particularly in the central and western portions of the Site. Importantly, the extent of capture is projected to expand where new wells are proposed and increased UAU pumping rates are expected, such as at RID-106 located near the leading edge of the plume.

In terms of overall value, the Less Aggressive groundwater alternative remedy provides the most practicable and lowest cost alternative that achieves an acceptable level of risk reduction while satisfying the WVBA WQARF Site groundwater RO of restoring the impacted groundwater for use as a source of drinking water.

[89] *See* ARS § 49-282.06.A.2.
[90] *See* ADEQ, *Final Remedial Objectives Report* (2012b)
[91] *See* ARS § 49-282.06.B.4.b.

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9.0 PROPOSED REMEDY

Based on the results of detailed analysis that is set forth in the *RID FS Report*, the Less Aggressive alternative remedy is the proposed regional groundwater remedy for the WVBA WQARF Site. As specified in AAC R18-16-407.I, reasons for selecting the proposed groundwater remedy shall include: how the comparison criteria were considered, how the proposed groundwater remedy will achieve the WVBA WQARF Site groundwater ROs, and how the proposed groundwater remedy meets the requirements of ARS § 49-282.06, including specifically ARS § 49-282.06.B.4.b. Additionally, AAC R18-16-407.G, requires that the proposed groundwater remedy address the needs of affected water providers.

9.1 COMPARISON CRITERIA

The evaluation criteria, including achievement of all WVBA WQARF Site groundwater ROs,[92] consistency with water management plans, practicability, risk, cost and benefit/value, were considered for each of the four (4) groundwater alternative remedies and discussed in the *RID FS Report*. The comparison of these criteria, as evaluated in relation to each other, was discussed in Section 8 and is summarized in **Table 9**.

9.1.1 ACHIEVEMENT OF REMEDIAL OBJECTIVES

As noted before, the scope of the *RID FS Report* and this *PRAP* was to identify possible regional groundwater alternative remedies to address target COCs in groundwater within the WVBA WQARF Site, which also has been commingled with target COCs from adjacent regional groundwater contaminant sites. As such, the FS Report was focused on groundwater contamination and addressing the impacts to water providers and protecting, at a minimum, all current and reasonably foreseeable water end uses as defined in the WVBA WQARF Site RO Report.[93] The analysis provided in the *RID FS Report* and described in Section 8 determined that all four (4) groundwater alternative remedies would meet the WVBA WQARF Site groundwater ROs for water use by addressing all impacted wells that are not suitable for current or reasonably foreseeable water end uses without treatment and ensuring that less impacted and threatened wells are suitable for current and reasonably foreseeable water end uses.

As shown in **Table 6**, all four (4) groundwater alternative remedies evaluated in the *RID FS Report* and discussed in this *PRAP* meet all essential WQARF requirements established to assure the proposed regional groundwater remedy, at a minimum, meets all ROs for all current and reasonably foreseeable water end uses within and outside the WVBA WQARF Site. The Most

[92] AAC R18-16-407.E.1.
[93] *See* ARS § 49-282.06.B.4.b.

Aggressive groundwater alternative remedy proposes direct treatment at all thirteen (13) existing wells that are impacted above AWQSs and MCLs making those wells unfit to produce water for their current or reasonably foreseeable water end uses without treatment; however, the costs associated with this groundwater alternative remedy are the highest of all four (4) groundwater alternative remedies. The Less Aggressive groundwater alternative remedy, which utilizes direct treatment at the six (6) most highly contaminated wells and addresses all of the other less impacted wells (albeit still above AWQSs/MCLs) through blending, distinguishes itself from the other groundwater alternative remedies in the *RID FS Report* as the most effective combination of practicability, cost, and benefit for timely restoration of the groundwater resource and mitigation of environmental and public health impacts, while fully compliant with all groundwater ROs for the WVBA WQARF Site and applicable state law requirements.

With regard to land use and impacts, numerous facility investigations have been conducted throughout the WVBA WQARF Site over the past 25 years to characterize and remediate the impacts of hazardous substance releases. The scope of the *RID FS Report*, which was a regional groundwater remedy evaluation, did not include past or future work to address soil contamination at sources areas, nor the impacts, if any, on the loss or impairment to land uses. Instead, the *RID FS Report* assumed, as does this *PRAP*, that the actions taken under ADEQ oversight have adequately addressed the known sources of hazardous substances impacting surface and subsurface soils and the potential this may have to cause a loss or impairment of land use. Further, should any additional information arise that identifies the need to address a presently unknown source of hazardous substances in surface or subsurface soil, it is assumed that ADEQ will assure that actions taken will not adversely impact or impair land uses in the WVBA WQARF Site.

9.1.2 CONFORMANCE WITH ARS § 49-282.06

As stated in ARS § 49-282.06.A., remedial actions shall:

1. Assure the protection of public health and welfare and the environment;
2. Provide for the control, management or cleanup of the hazardous substances in order to allow the maximum beneficial use of the [impacted] waters of the state; and,
3. Be reasonable, necessary, cost-effective and technically feasible.

As discussed in more detail in the *RID FS Report*, the proposed regional groundwater remedy, the Less Aggressive groundwater alternative remedy, meets all of these requirements. Treatment systems will cost effectively remove a large portion of hazardous substances from the environment, protecting public health and welfare, while providing for the control and cleanup necessary to allow “maximum beneficial use” as a drinking water source of the remediated water. The Less Aggressive groundwater alternative remedy also is reasonable,

cost-effective and technically feasible as discussed Section 8.

In addition, ARS § 49-282.06.B.4.b. expressly requires that the selected remedial action for waters of the state "shall address, at a minimum, any well that at the time of selection of the remedial action either supplies water for municipal, domestic, industrial, irrigation or agricultural uses or is part of a public water system if the well would now or in the reasonably foreseeable future produce water that would not be fit for its current or reasonably foreseeable end uses without treatment due to the release of hazardous substances." Likewise, ARS § 49-282.06.B.4.b. expressly requires that "specific measures to address any such well shall not reduce the supply of water available to the owner of the well." The Less Aggressive groundwater alternative remedy conforms to these requirements by ensuring all existing wells within the WVBA WQARF Site will produce water that is fit for its current and reasonably foreseeable end uses as determined in the groundwater ROs for the WVBA WQARF Site and restoring any reduction in the available supply of water caused by addressing any impacted wells.

9.1.3 CONSISTENCY WITH WATER MANAGEMENT PLANS

Previous analysis in the *RID FS Report* and as provided in Section 8 determined that all four (4) groundwater alternative remedies were consistent with affected water provider needs and management plans. As shown in **Table 9**, all four (4) alternative groundwater remedies meet all essential WQARF requirements that have been established to assure the proposed regional groundwater remedy meets the water management needs of affected water providers. The Most Aggressive groundwater alternative remedy, at a substantial cost, fully addresses RID's needs to directly treat all impacted wells having COCs in excess of AWQSs/MCLs and addresses the needs of all water providers (RID, SRP, COP, APS and COT) by ensuring that any impacted or threatened existing well within and adjacent to the WVBA WQARF Site will now and in the reasonable foreseeable future (i.e. at least over the next 100 years) produce water fit for its "current or reasonably foreseeable end uses" for all water providers pursuant to ARS § 49-282.06.B.4.b. The Less Aggressive groundwater alternative remedy, however, is adequate to meet the needs of all of the water providers and distinguishes itself from the other groundwater remedies in the *RID FS Report* as the most effective combination of practicability, cost, and benefit for timely restoration of the groundwater resource and mitigation of environmental and public health impacts, while fully compliant with all groundwater ROs for the WVBA WQARF Site and applicable state law requirements.

9.1.4 CONSISTENCY WITH GENERAL LAND USE PLANNING

As explained in the *RID FS Report* and as mentioned in the discussion of land use ROs in this *PRAP,* the source area work that has been or may be conducted to address facility-specific releases of hazardous substances is independent of and outside the scope of the *RID FS Report* and this *PRAP*. With respect to the proposed groundwater remedy, the actions necessary to

implement the Less Aggressive groundwater alternative remedy will have minimal impact on land use in the WVBA WQARF Site.

The remedial measures for the Less Aggressive groundwater alternative remedy listed in Section 7.5.3 of the *RID FS Report* all involve enhanced water infrastructure at RID well sites and within the RID water distribution system. However, there are two (2) locations at RID-106 and RID-109 where it will be necessary to acquire land to build out the remedy components. Review of aerial photographs indicates there is vacant or undeveloped land adjacent to these well sites, the surrounding land use is commercial and industrial private property, and the planned remedial measures are consistent with existing land uses.

9.2 CONTINGENCIES

As explained in the *RID FS Report* and as discussed in Section 8, the Less Aggressive groundwater alternative remedy is subject to uncertainties that may require contingency actions. The COP owns four (4) shallow production wells within the WVBA WQARF Site. Although the City has indicated it does not intend to use the wells and the wells are currently capped and out of service, the City has an established right to withdraw groundwater at these wells. Should the City require the wells for some non-potable use[94] in the future, then it will be necessary to evaluate potential remedial measures and take appropriate actions to address the water provider needs.

With respect to uncertainties associated with implementation of the remedial measures for the Less Aggressive groundwater alternative remedy, this action requires additional land in the vicinity of RID 106 and RID-109 to install wellhead treatment systems, and in the case of RID-106, to drill a replacement well. Review of aerial photographs of these locations indicates there is vacant or undeveloped land adjacent to the wells. From a planning perspective, it appears reasonable to assume that sufficient land can be acquired for the planned remedial measures. Should any constraints arise that limit land access or acquisition, further action may be necessary by ADEQ or RID to acquire the necessary land by eminent domain.

The Less Aggressive groundwater alternative remedy indirectly addresses groundwater contamination at well RID-84, which currently has PCE contamination in excess of MCLs/AWQSs, by expanded pumping and treatment of RID-106 and prioritized pumping of wells in this area as a means to limit PCE contamination at RID-84. Although projected groundwater modeling simulations provide reason to believe that this approach will effectively address the RID-84 impact, it is not assured this action will achieve MCLs/AWQSs at RID-84 or the timeframe it may require. Once actions to increase production capacity at RID-106 are completed, RID will monitor water quality and groundwater conditions throughout the leading

[94] As noted previously, COP operates under a set of long-standing policies, including specific city council direction, which discourages or outright prohibits the introduction of contaminated groundwater through a treatment plant directly into the potable distribution system (*See* **Appendix E** of the *RID FS Report*).

edge of the plume to determine the effectiveness of this approach in limiting contamination at RID-84. If, after three (3) years, PCE concentrations are not declining at RID-84, and/or there has been no change in the AWQS/MCL for PCE based on EPA's recent toxicity information,[95] contingent actions may be necessary. With ADEQ approval, RID would take subsequent action at RID-84 to reconfigure the well to enable injection of water from the adjacent RID Main Canal, to further mitigate COC impacts, consistent with the approach described in Appendix G to the *RID FS Report*. In the unlikely event that this subsequent contingency action is unsuccessful, wellhead treatment may be necessary.

Beyond these specific concerns, there are other broad-based uncertainties that may pose a potential impact to the outcome of the proposed regional groundwater remedial action. These uncertainties include:

- The extent to which the Less Aggressive groundwater alternative remedy is able to provide physical containment of the plume, to reduce contamination at impacted wells that are currently below AWQSs/MCLs and prevent threatened wells from becoming impacted in the future; and,
- The potential action by EPA to lower the MCL for TCE, thereby lowering the treatment goals associated with this remedial action.

With respect to plume containment, the Less Aggressive groundwater alternative remedy would include on-going monitoring of groundwater elevations and water quality to determine whether groundwater extraction in the WVBA WQARF Site is effective in physically containing the plume and preventing it from migrating to impacted wells that are not currently impacted above AWQSs/MCLs or to threatened wells that are not currently impacted by COCs. Although not considered likely, should future monitoring data indicate that RID, SRP, COP or COT wells outside of the plume show increasing COC impacts, contingent actions may be necessary to more fully contain the contaminant plume.

Finally, there is uncertainty regarding whether and the extent to which the MCL for TCE may be reduced, through pending action by EPA. If this change occurs, the specific time period for completing the remedy (the next 50 plus years) would likely increase and there may be need to treat additional wells since the target for blending (the MCL) is now 5 µg/L for TCE and the revised MCL could be substantially lower. Concentrations in individual wells also will change with time. Routine monitoring of water quality within the RID well field and water system will be conducted to track trends and assure blended water supplies meet target water quality. Adjustments to the remedy could be warranted based on the results of system monitoring. The modular nature of the wellhead treatment systems will facilitate relocation of treatment systems should contaminant distribution change significantly.

[95] *See* footnote 19 regarding EPA's recent changes to the risk factor for PCE.

Despite these potential contingencies, implementation of the proposed regional groundwater remedy will commence immediately even as RID continues independent efforts to obtain cost recovery, including potential settlements, from various third parties.

9.3 REMEDIATED WATER END USE

Consistent with the *RID FS Report*, remediated water that is conveyed via the Salt Canal will be used for either agricultural purpose, by release into the Main Canal, or municipal and industrial (M&I) use. M&I use will require the construction of a pipeline within and/or along the RID Main Canal right-of-way, to convey this remediated water to users in the west valley.

Water produced from RID-84, RID-89, RID-92, RID-95 and RID-100 will continue to be conveyed through the Main Canal (and feeder laterals) to RID lands for its current use as an agricultural water supply. Any potential future M&I use of this water supply may require RID to discontinue the delivery of treated effluent in the Main Canal.

9.4 LEAD AGENCY STATEMENT FOR REMEDY SELECTION

Consistent with AAC R18-16-407.I and based on the detailed analysis set forth in the *RID FS Report* and this *PRAP,* the Less Aggressive Remedy is the proposed regional groundwater remedy for the WVBA WQARF Site. On April 13, 2015, ADEQ completed its review of the *RID FS Report* that was submitted to ADEQ for approval under AAC R18-16-413. Pursuant to AAC R18-16-413, the *RID FS Report* was published and the public was provided an opportunity to comment on RID's request for approval. After considering the public comments and RID's comprehensive responses, ADEQ approved the *RID FS Report* after a determination that "the FS Report meets the requirements of Arizona Revised Statutes 49-287.03 and Arizona Administrative Code R18-16-407."

10.0 COMMUNITY PARTICIPATION

Public participation and community relations activities associated with the groundwater remedy selection process will follow community involvement requirements of AAC R18-16-404 and the *Community Involvement Plan for West Van Buren WQARF Site, Phoenix, Arizona* (ADEQ, 2011a). Consistent with this *Community Involvement Plan*, ADEQ will lead the public outreach and coordinate public communication and comments. Specific community involvement activities may include the preparation and distribution of public notices describing the availability of the ADEQ-approved *RID FS Report* and this *PRAP* for public review and participation in public meetings to discuss the ADEQ-approved *RID FS Report* and *PRAP*.

In order to broaden communication outreach and enhance transparency, RID will continue to deliver messages and information, in coordination with ADEQ, through the various communications channels and platforms developed for the Early Response Action. These channels and platforms include one-on-one briefings with interested individuals, group presentations, electronic and print media, and web-based communications.

10.1 PUBLIC COMMENT PERIOD OF PRAP

The public comment period will be no less than 30 days. ADEQ will accept written comments on this *PRAP* that are postmarked within the comment period and submitted to:

Scott R. Green, Manager, Remedial Projects Unit
Arizona Department of Environmental Quality,
1110 West Washington Street
Phoenix, Arizona 85007

10.2 PUBIC MEETINGS

There will be a WVBA WQARF CAB meeting where the public will hear a presentation on the *PRAP*. Oral and written comments will also be accepted at the meeting. The meeting will be held one week prior to the end of the comment period.

10.3 ADMINISTRATIVE RECORD

Interested parties can review the *PRAP* and other Site documents at the Burton Barr Central Library (Arizona Room) located at 1221 N. Central Avenue in Phoenix (602) 262-4636 or on ADEQ's website for the WVBA WQARF Site.

The complete official WVBA WQARF Site file also can be reviewed at the ADEQ Main Office located at 1110 West Washington Street, Phoenix, Arizona. With 24-hour notice, an appointment to review related documentation is available Monday through Friday from 8:30 a.m. to 4:30 p.m., at the ADEQ Records management Center. Please contact (602) 771-4380 or (800) 234-5677 to schedule an appointment to review these documents.

10.4 OTHER CONTACT INFORMATION

Name/Title/Address	Phone/Fax	E-mail
Scott R. Green, ADEQ Remedial Projects Unit	(602) 771.1612 (602) 771-4138 fax	SRG@azdeq.gov
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SYNERGY ENVIRONMENTAL, LLC

TABLES

TABLE 1. SUMMARY OF WATER QUALITY - ADEQ MONITOR WELLS, MARCH 2013

West Van Buren Area WQARF Site

WVBA WELL ID			**AVB10-01**	**AVB12-01**	**AVB14-01**	**AVB15-01**	**AVB18-01**	**AVB20-03**	**AVB26-01**
Sample ID (last three digits identify sample depth)			AVB10-0100-37120	AVB12-0100-36152	AVB14-0100-34108	AVB15-0100-14116	AVB18-0100-35108	AVB20-0300-19149	AVB26-0100-15099
Date Collected			3/13/13	3/18/13	3/18/13	3/19/13	3/25/13	3/20/13	3/15/13
Owner/Facility			ESTRELLA BUSINESS PARK	ADEQ 7TH AVE	ADEQ 7TH AVE	ROGERS SHELL	ADEQ 7TH AVE	APS WEST PHOENIX	ADOT
Facility Well No.			MW-1	MW-4	MW-2	MW-2	MW-1	RB-3	DW-2
Sample Type			PURGE	PURGE	PURGE	PURGE	PDB	PURGE	PDB
ADWR No.			55-532041	55-532767	55-531086	55-520257	55-531084	55-590922	55-504687
Alluvial Unit			UAU1	UAU1	UAU1	UAU1	UAU1	UAU1	UAU1
Lab ID No.			**459172-006**	**459346-004**	**459346-005**	**459504-007**	**459871-002**	**459593-001**	**459337-015**
Component - EPA 8260B	AWQS	Units							
Acetone	NE	ug/L	<20.0	<20.0	<20.0	<20.0	NA	<20.0	NA
Benzene	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Bromobenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
Bromochloromethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Bromodichloromethane	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Bromoform	100	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
Bromomethane	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
2-Butanone (MEK)	NE	ug/L	<5.00	<5.00	<5.00	<5.00	NA	<5.00	NA
MTBE	NE	ug/L	<2.00	<2.00	<2.00	<2.00	NA	<2.00	NA
n-Butylbenzene	NE	ug/L	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50
sec-Butylbenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
tert-Butylbenzene	NE	ug/L	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50
Carbon Disulfide	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Carbon Tetrachloride	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Chlorobenzene	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Chloroethane	NE	ug/L	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00
Chloroform	100	ug/L	<0.500	<0.500	**1.69**	**0.940**	<0.500	**4.22**	<0.500
Chloromethane	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
2-Chlorotoluene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
4-Chlorotoluene	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
p-Isopropyltoluene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
Dibromochloromethane	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,2-Dibromo-3-chloropropane	0.2	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
1,2-Dibromoethane (EDB)	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Dibromomethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,2-Dichlorobenzene	600	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
1,3-Dichlorobenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
1,4-Dichlorobenzene	75	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
Dichlorodifluoromethane	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
1,1-Dichloroethane (1,1-DCA)	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	**1.78**	<0.500
1,2-Dichloroethane	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,1-Dichloroethene (1,1-DCE)	7	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	**2.17**	<0.500
cis-1,2-Dichloroethene	70	ug/L	**0.62**	<0.500	**1.20**	**6.20**	<0.500	**6.98**	<0.500
trans-1,2-Dichloroethene	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,2-Dichloropropane	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,3-Dichloropropane	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
2,2-Dichloropropane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,1-Dichloropropene	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
cis-1,3-Dichloropropene	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
trans-1,3-Dichloropropene	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Ethylbenzene	700	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
Hexachlorobutadiene	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
2-Hexanone	NE	ug/L	<5.00	<5.00	<5.00	<5.00	NA	<5.00	NA
Isopropylbenzene	NE	ug/L	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50
Methylene chloride	NE	ug/L	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00
Methyl Iodide	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
4-Methyl-2-pentanone (MIBK)	NE	ug/L	<5.00	<5.00	<5.00	<5.00	NA	<5.00	NA
Napthalene	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
n-Propylbenzene	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
Styrene	100	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
1,1,1,2-Tetrachloroethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,1,2,2-Tetrachloroethane	NE	ug/L	<5.00	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Tetrachloroethene (PCE)	5	ug/L	**23.9**	**4.04**	<0.500	**3.07**	<0.500	**8.6**	**1.49**
Toluene	1000	ug/L	**4.53 (S)**	<2.0	<2.0	<2.0	<2.00	<2.0	<2.00
1,2,3-Trichlorobenzene	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
1,2,4-Trichlorobenzene	70	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
1,1,1-Trichloroethane (TCA)	200	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<0.500	<5.00
1,1,2-Trichloroethane	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Trichloroethene (TCE)	5	ug/L	**2.00**	**3.85**	**4.37**	**34.7**	**0.680**	**47.6**	**0.630**
Trichlorofluoromethane (CFC 11)	NE	ug/L	<2.00	<2.0	<2.0	<2.0	<2.00	<2.0	<2.00
1,2,3-Trichloropropane	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
1,2,4-Trimethylbenzene	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
1,3,5-Trimethylbenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
o-Xylene	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
m,p-Xylenes	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
Vinyl Acetate	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
Vinyl Chloride	2	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Xylenes, Total	10000	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
1,4-Dioxane	NE	ug/L	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00
Total Chromium	0.1	mg/l	**0.0144**	<0.0100	**0.0211**	**0.0146**	NA	<0.0100	NA
Dissolved Chromium	0.1	mg/l	<0.0100	<0.0100	<0.0100	<0.0100	NA	<0.0100	NA

Explanation:

NE - Not Established; NA - Not Analyzed

Shading indicates AWQS equaled or exceeded

(S) - data suspect

(J) - estimated value

(ND) considered not detected due to field blank cont

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TABLE 1. SUMMARY OF WATER QUALITY - ADEQ MONITOR WELLS, MARCH 2013
West Van Buren Area WQARF Site

WVBA WELL ID			**AVB38-04**	**AVB40-05**	**AVB40-06**	**AVB40-07**	**AVB40-08**	**AVB57-01**	**AVB68-02**
Sample ID (last three digits identify sample depth)			AVB38-05x110	AVB40-0500-21098	AVB110-0600-21098	AVB40-0700-21098	AVB40-0800-18098	AVB57-0100-32100	AVB68-0200-24110
Date Collected			3/25/13	3/15/13	3/15/13	3/15/13	3/18/13	3/18/13	3/25/13
Owner/Facility			ADEQ	ADEQ-ALSCO	ADEQ-ALSCO	ADEQ-ALSCO	ADEQ-ALSCO	ADEQ	ADEQ
Facility Well No.			AVB38-04	MW-3	MW-1	MW-2	MW-4	APS-1	MW-2
Sample Type			GRAB	PDB	PDB	PDB	GRAB	PURGE	GRAB
ADWR No.			55-535311	55-536228	55-536229	55-536227	55-536284	55-539219	55-561942
Alluvial Unit			UAU1	UAU1	UAU1	UAU1	UAU1	UAU1	UAU1
Lab ID No.			**459871-011**	**459337-004**	**459337-009**	**459337-005**	**459346-008**	**459346-002**	**459871-005**
Component - EPA 8260B	AWQS	Units							
Acetone	NE	ug/L	NA	NA	NA	NA	NA	<20.0	NA
Benzene	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Bromobenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
Bromochloromethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Bromodichloromethane	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Bromoform	100	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
Bromomethane	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
2-Butanone (MEK)	NE	ug/L	NA	NA	NA	NA	NA	<5.00	NA
MTBE	NE	ug/L	NA	NA	NA	NA	NA	<2.00	NA
n-Butylbenzene	NE	ug/L	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50
sec-Butylbenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
tert-Butylbenzene	NE	ug/L	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50
Carbon Disulfide	NE	ug/L	<0.500	**0.590**	<0.500	<0.500	<0.500	<0.500	<0.500
Carbon Tetrachloride	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Chlorobenzene	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Chloroethane	NE	ug/L	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00
Chloroform	100	ug/L	**2.47**	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Chloromethane	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
2-Chlorotoluene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
4-Chlorotoluene	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
p-Isopropyltoluene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
Dibromochloromethane	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,2-Dibromo-3-chloropropane	0.2	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
1,2-Dibromoethane (EDB)	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Dibromomethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,2-Dichlorobenzene	600	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
1,3-Dichlorobenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
1,4-Dichlorobenzene	75	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
Dichlorodifluoromethane	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
1,1-Dichloroethane (1,1-DCA)	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,2-Dichloroethane	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,1-Dichloroethene (1,1-DCE)	7	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
cis-1,2-Dichloroethene	70	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
trans-1,2-Dichloroethene	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,2-Dichloropropane	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,3-Dichloropropane	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
2,2-Dichloropropane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,1-Dichloropropene	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
cis-1,3-Dichloropropene	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
trans-1,3-Dichloropropene	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Ethylbenzene	700	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
Hexachlorobutadiene	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
2-Hexanone	NE	ug/L	NA	NA	NA	NA	NA	<5.00	NA
Isopropylbenzene	NE	ug/L	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50
Methylene chloride	NE	ug/L	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00
Methyl Iodide	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
4-Methyl-2-pentanone (MIBK)	NE	ug/L	NA	NA	NA	NA	NA	<5.00	NA
Napthalene	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
n-Propylbenzene	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
Styrene	100	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
1,1,1,2-Tetrachloroethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,1,2,2-Tetrachloroethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Tetrachloroethene (PCE)	5	ug/L	**2.01**	**3.06**	**1.58**	**24.5**	**3.69**	**0.590**	<0.500
Toluene	1000	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.0	<2.00
1,2,3-Trichlorobenzene	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
1,2,4-Trichlorobenzene	70	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
1,1,1-Trichloroethane (TCA)	200	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
1,1,2-Trichloroethane	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Trichloroethene (TCE)	5	ug/L	**0.810**	**3.07**	**2.04**	**6.59**	**9.62**	<0.500	**1.27**
Trichlorofluoromethane (CFC 11)	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.0	<2.00
1,2,3-Trichloropropane	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
1,2,4-Trimethylbenzene	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
1,3,5-Trimethylbenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
o-Xylene	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
m,p-Xylenes	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
Vinyl Acetate	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
Vinyl Chloride	2	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Xylenes, Total	10000	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
1,4-Dioxane	NE	ug/L	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00
Total Chromium	0.1	mg/l	NA	NA	NA	NA	**0.0185**	**0.465**	NA
Dissolved Chromium	0.1	mg/l	NA	NA	NA	NA	<0.0100	<0.0100	NA

Explanation:

NE - Not Established; NA - Not Analyzed

Shading indicates AWQS equaled or exceeded

(S) - data suspect

(J) - estimated value

(ND) considered not detected due to field blank cont

SYNERGY ENVIRONMENTAL, LLC

TABLE 1. SUMMARY OF WATER QUALITY - ADEQ MONITOR WELLS, MARCH 2013
West Van Buren Area WQARF Site

WVBA WELL ID			**AVB69-02R**	**AVB70-01**	**AVB71-01**	**AVB72-01**	**AVB73-01**	**AVB74-01**	**AVB75-01**
Sample ID (last three digits identify sample depth)			AVB69-02R0-01128	AVB70-0100-25115	AVB71-0100-25158	AVB72-0100-24135	AVB73-0100-23118	AVB74-0100-33098	AVB75-0100-25132
Date Collected			3/18/13	3/19/13	3/21/13	3/19/13	3/21/13	3/21/13	3/21/13
Owner/Facility			ADEQ	ADEQ	ADEQ	ADEQ	ADEQ	ADEQ	ADEQ
Facility Well No.			AVB69-02R	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6
Sample Type			PURGE	PURGE	PURGE	PURGE	PURGE	PURGE	PURGE
ADWR No.			55-914602	55-569883	55-569741	55-569882	55-569882	55-570051	55-569881
Alluvial Unit			UAU1	UAU1	UAU1	UAU1	UAU1	UAU1	UAU1
Lab ID No.			**459346-009**	**459504-006**	**459683-004**	**459504-008**	**459683-007**	**459683-005**	**459683-006**
Component - EPA 8260B	AWQS	Units							
Acetone	NE	ug/L	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0
Benzene	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Bromobenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
Bromochloromethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Bromodichloromethane	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Bromoform	100	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
Bromomethane	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
2-Butanone (MEK)	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
MTBE	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
n-Butylbenzene	NE	ug/L	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50
sec-Butylbenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
tert-Butylbenzene	NE	ug/L	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50
Carbon Disulfide	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Carbon Tetrachloride	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Chlorobenzene	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Chloroethane	NE	ug/L	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00
Chloroform	100	ug/L	<0.500	<0.500	<0.500	**1.89**	<0.500	<0.500	<0.500
Chloromethane	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
2-Chlorotoluene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
4-Chlorotoluene	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
p-Isopropyltoluene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
Dibromochloromethane	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,2-Dibromo-3-chloropropane	0.2	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
1,2-Dibromoethane (EDB)	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Dibromomethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,2-Dichlorobenzene	600	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
1,3-Dichlorobenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
1,4-Dichlorobenzene	75	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
Dichlorodifluoromethane	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
1,1-Dichloroethane (1,1-DCA)	NE	ug/L	<0.500	**0.850**	<0.500	<0.500	<0.500	<0.500	<0.500
1,2-Dichloroethane	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,1-Dichloroethene (1,1-DCE)	7	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
cis-1,2-Dichloroethene	70	ug/L	<0.500	**7.25**	<0.500	**1.00**	<0.500	<0.500	**1.03**
trans-1,2-Dichloroethene	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,2-Dichloropropane	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,3-Dichloropropane	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
2,2-Dichloropropane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,1-Dichloropropene	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
cis-1,3-Dichloropropene	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
trans-1,3-Dichloropropene	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Ethylbenzene	700	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
Hexachlorobutadiene	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
2-Hexanone	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
Isopropylbenzene	NE	ug/L	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50
Methylene chloride	NE	ug/L	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00
Methyl Iodide	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
4-Methyl-2-pentanone (MIBK)	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
Napthalene	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
n-Propylbenzene	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
Styrene	100	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
1,1,1,2-Tetrachloroethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,1,2,2-Tetrachloroethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Tetrachloroethene (PCE)	5	ug/L	**7.24**	**11.2**	<0.500	**2.79**	**2.05**	<0.500	**13.6**
Toluene	1000	ug/L	<2.00	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
1,2,3-Trichlorobenzene	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
1,2,4-Trichlorobenzene	70	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
1,1,1-Trichloroethane (TCA)	200	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
1,1,2-Trichloroethane	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Trichloroethene (TCE)	5	ug/L	<0.500	**7.16**	<0.500	**6.70**	<0.500	<0.500	**2.29**
Trichlorofluoromethane (CFC 11)	NE	ug/L	<2.00	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
1,2,3-Trichloropropane	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
1,2,4-Trimethylbenzene	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
1,3,5-Trimethylbenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
o-Xylene	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
m,p-Xylenes	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
Vinyl Acetate	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
Vinyl Chloride	2	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Xylenes, Total	10000	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
1,4-Dioxane	NE	ug/L	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00
Total Chromium	0.1	mg/l	**0.0254**	**3.19**	**1.21**	**1.19**	**2.32**	**5.74**	**3.84**
Dissolved Chromium	0.1	mg/l	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	**0.0322**	<0.0100

Explanation:

NE - Not Established; NA - Not Analyzed

Shading indicates AWQS equaled or exceeded

(S) - data suspect

(J) - estimated value

(ND) considered not detected due to field blank cont

SYNERGY ENVIRONMENTAL, LLC

TABLE 1. SUMMARY OF WATER QUALITY - ADEQ MONITOR WELLS, MARCH 2013
West Van Buren Area WQARF Site

WVBA WELL ID			**AVB76-01**	**AVB77-01**	**AVB77-03**	**AVB81-02**	**AVB83-01**	**AVB84-01**	**AVB85-01**
Sample ID (last three digits identify sample depth)			AVB76-0100-21113	AVB77-0100-24108	AVB77-0300-24215	AVB81-0200-22118	AVB83-0100-22114	AVB84-0100-XXX	AVB85-0100-23112
Date Collected			3/21/13	3/15/13	3/15/13	3/25/13	3/15/13	3/15/13	3/15/13
Owner/Facility			ADEQ	ADEQ	ADEQ	ADEQ	ADEQ	ADEQ	ADEQ
Facility Well No.			MW-7	MW-5S	MW-5M	AVB81-02	AVB83-01	AVB84-01	AVB85-01
Sample Type			PURGE	PDB	PDB	PDB	PDB	PDB	PDB
ADWR No.			55-570052	55-567445	55-567444	55-584500	55-584501	55-584497	55-584505
Alluvial Unit			UAU1	UAU1	UAU1	UAU1	UAU1	UAU1	UAU1
Lab ID No.			**459683-003**	**459337-006**	**459337-008**	**459871-013**	**459337-010**	**459337-014**	**459337-016**
Component - EPA 8260B	AWQS	Units							
Acetone	NE	ug/L	<20.0	NA	NA	NA	NA	NA	NA
Benzene	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Bromobenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
Bromochloromethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Bromodichloromethane	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Bromoform	100	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
Bromomethane	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
2-Butanone (MEK)	NE	ug/L	<5.00	NA	NA	NA	NA	NA	NA
MTBE	NE	ug/L	<2.00	NA	NA	NA	NA	NA	NA
n-Butylbenzene	NE	ug/L	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50
sec-Butylbenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
tert-Butylbenzene	NE	ug/L	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50
Carbon Disulfide	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Carbon Tetrachloride	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Chlorobenzene	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Chloroethane	NE	ug/L	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00
Chloroform	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Chloromethane	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
2-Chlorotoluene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
4-Chlorotoluene	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
p-Isopropyltoluene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
Dibromochloromethane	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,2-Dibromo-3-chloropropane	0.2	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
1,2-Dibromoethane (EDB)	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Dibromomethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,2-Dichlorobenzene	600	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
1,3-Dichlorobenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
1,4-Dichlorobenzene	75	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
Dichlorodifluoromethane	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
1,1-Dichloroethane (1,1-DCA)	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,2-Dichloroethane	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,1-Dichloroethene (1,1-DCE)	7	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
cis-1,2-Dichloroethene	70	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	**15.5**
trans-1,2-Dichloroethene	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,2-Dichloropropane	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,3-Dichloropropane	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
2,2-Dichloropropane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,1-Dichloropropene	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
cis-1,3-Dichloropropene	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
trans-1,3-Dichloropropene	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Ethylbenzene	700	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
Hexachlorobutadiene	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
2-Hexanone	NE	ug/L	<5.00	NA	NA	NA	NA	NA	NA
Isopropylbenzene	NE	ug/L	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50
Methylene chloride	NE	ug/L	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00
Methyl Iodide	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
4-Methyl-2-pentanone (MIBK)	NE	ug/L	<5.00	NA	NA	NA	NA	NA	NA
Napthalene	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
n-Propylbenzene	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
Styrene	100	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
1,1,1,2-Tetrachloroethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,1,2,2-Tetrachloroethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Tetrachloroethene (PCE)	5	ug/L	<0.500	**1.47**	<0.500	<0.500	**1.40**	<0.500	**36.8**
Toluene	1000	ug/L	<2.0	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
1,2,3-Trichlorobenzene	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
1,2,4-Trichlorobenzene	70	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
1,1,1-Trichloroethane (TCA)	200	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	**0.600**
1,1,2-Trichloroethane	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Trichloroethene (TCE)	5	ug/L	<0.500	**2.77**	**0.840**	<0.500	**1.47**	**0.560**	**10.1**
Trichlorofluoromethane (CFC 11)	NE	ug/L	<2.0	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
1,2,3-Trichloropropane	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
1,2,4-Trimethylbenzene	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
1,3,5-Trimethylbenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
o-Xylene	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
m,p-Xylenes	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
Vinyl Acetate	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
Vinyl Chloride	2	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Xylenes, Total	10000	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
1,4-Dioxane	NE	ug/L	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00
Total Chromium	0.1	mg/l	**0.361**	NA	NA	NA	NA	NA	NA
Dissolved Chromium	0.1	mg/l	**0.0115**	NA	NA	NA	NA	NA	NA

Explanation:

NE - Not Established; NA - Not Analyzed

Shading indicates AWQS equaled or exceeded

(S) - data suspect

(J) - estimated value

(ND) considered not detected due to field blank cont

SYNERGY ENVIRONMENTAL, LLC

TABLE 1. SUMMARY OF WATER QUALITY - ADEQ MONITOR WELLS, MARCH 2013
West Van Buren Area WQARF Site

WVBA WELL ID			**AVB88-01**	**AVB91-01**	**AVB92-01**	**AVB92-02**	**AVB93-01**	**AVB94-01**	**AVB94-02**
Sample ID (last three digits identify sample depth)			AVB88-0100-23118	AVB91-0100-21138	AVB92-0100-19138	AVB92-0200-XXX	AVB93-0100-20137	AVB94-0100-17138	AVB94-0200-21260
Date Collected			3/19/13	3/21/13	3/20/13	3/26/13	3/20/13	3/26/13	3/26/13
Owner/Facility			ADEQ	ADEQ	ADEQ	ADEQ	ADEQ	ADEQ	ADEQ
Facility Well No.			AVB88-01	AVB91-01	AVB92-01	AVB92-02	AVB93-01	AVB94-01	AVB94-02
Sample Type			PURGE	PURGE	PURGE	PDB	PURGE	PDB	PDB
ADWR No.			55-584498	55-589635	55-589637	55-589646	55-589638	55-589639	55-589642
Alluvial Unit			UAU1	UAU1	UAU1	UAU1	UAU1	UAU1	UAU1
Lab ID No.			**459504-002**	**459683-002**	**459592-007**	**459938-012**	**459592-006**	**459938-007**	**459938-006**
Component - EPA 8260B	AWQS	Units							
Acetone	NE	ug/L	<20.0	<20.0	<20.0	NA	<20.0	NA	NA
Benzene	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Bromobenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
Bromochloromethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Bromodichloromethane	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Bromoform	100	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
Bromomethane	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
2-Butanone (MEK)	NE	ug/L	<5.00	<5.00	<5.00	NA	<5.00	NA	NA
MTBE	NE	ug/L	<2.00	<2.00	<2.00	NA	<2.00	NA	NA
n-Butylbenzene	NE	ug/L	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50
sec-Butylbenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
tert-Butylbenzene	NE	ug/L	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50
Carbon Disulfide	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Carbon Tetrachloride	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Chlorobenzene	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Chloroethane	NE	ug/L	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00
Chloroform	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	**0.570**
Chloromethane	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
2-Chlorotoluene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
4-Chlorotoluene	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
p-Isopropyltoluene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
Dibromochloromethane	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,2-Dibromo-3-chloropropane	0.2	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
1,2-Dibromoethane (EDB)	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Dibromomethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,2-Dichlorobenzene	600	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
1,3-Dichlorobenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
1,4-Dichlorobenzene	75	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
Dichlorodifluoromethane	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	**11.9**	<2.00
1,1-Dichloroethane (1,1-DCA)	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,2-Dichloroethane	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	**1.57**	<0.500
1,1-Dichloroethene (1,1-DCE)	7	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	**1.43**	<0.500
cis-1,2-Dichloroethene	70	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
trans-1,2-Dichloroethene	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,2-Dichloropropane	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,3-Dichloropropane	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
2,2-Dichloropropane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,1-Dichloropropene	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
cis-1,3-Dichloropropene	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
trans-1,3-Dichloropropene	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Ethylbenzene	700	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
Hexachlorobutadiene	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
2-Hexanone	NE	ug/L	<5.00	<5.00	<5.00	NA	<5.00	NA	NA
Isopropylbenzene	NE	ug/L	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50
Methylene chloride	NE	ug/L	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00
Methyl Iodide	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
4-Methyl-2-pentanone (MIBK)	NE	ug/L	<5.00	<5.00	<5.00	NA	<5.00	NA	NA
Napthalene	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
n-Propylbenzene	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
Styrene	100	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
1,1,1,2-Tetrachloroethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,1,2,2-Tetrachloroethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Tetrachloroethene (PCE)	5	ug/L	**65.1**	<0.500	<0.500	<0.500	**8.31**	<0.500	**2.76**
Toluene	1000	ug/L	<2.0	<2.0	<2.0	<2.00	<2.0	<2.00	<2.00
1,2,3-Trichlorobenzene	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
1,2,4-Trichlorobenzene	70	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
1,1,1-Trichloroethane (TCA)	200	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
1,1,2-Trichloroethane	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Trichloroethene (TCE)	5	ug/L	<0.500	<0.500	<0.500	**13.5**	<0.500	**27.8**	**4.19**
Trichlorofluoromethane (CFC 11)	NE	ug/L	<2.0	<2.0	<2.0	<2.00	<2.0	<2.00	<2.00
1,2,3-Trichloropropane	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
1,2,4-Trimethylbenzene	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
1,3,5-Trimethylbenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
o-Xylene	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
m,p-Xylenes	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
Vinyl Acetate	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
Vinyl Chloride	2	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Xylenes, Total	10000	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
1,4-Dioxane	NE	ug/L	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00
Total Chromium	0.1	mg/l	**0.0607**	**0.141**	**0.0575**	NA	**0.0295**	NA	NA
Dissolved Chromium	0.1	mg/l	**0.0569**	**0.0208**	**0.0115**	NA	<0.0100	NA	NA

Explanation:

NE - Not Established; NA - Not Analyzed

Shading indicates AWQS equaled or exceeded

(S) - data suspect

(J) - estimated value

(ND) considered not detected due to field blank cont

SYNERGY ENVIRONMENTAL, LLC

TABLE 1. SUMMARY OF WATER QUALITY - ADEQ MONITOR WELLS, MARCH 2013
West Van Buren Area WQARF Site

WVBA WELL ID			AVB95-01	AVB95-02	AVB96-01	AVB97-01	AVB99-01	AVB103-02	AVB106-01
Sample ID (last three digits identify sample depth)			AVB95-0100-21138	AVB95-0200-X230	AVB96-0100-20121	AVB97-0100-20118	AVB99-0100-21109	AVB102-0200-12098	AVB106-0100-25102
Date Collected			3/26/13	3/26/13	3/26/13	3/19/13	3/15/13	3/18/13	3/18/13
Owner/Facility			ADEQ	34TH AVE/ROOSEVELT	ADEQ	ADEQ	ADEQ	TRISTAR	MARICOPA COUNTY
Facility Well No.			AVB95-01	AVB95-02	AVB96-01	AVB97-01	AVB99-01	MW-2	MC-05
Sample Type			PDB	PDB	PDB	GRAB	PDB	PURGE	PURGE
ADWR No.			55-589636	55-626533	55-589640	55-589641	55-589634	55-581001	55-549619
Alluvial Unit			UAU1	UAU1	UAU1	UAU1	UAU1	UAU1	UAU1
Lab ID No.			**459938-002**	**459938-003**	**459938-014**	**459504-004**	**459337-011**	**459346-006**	**459346-003**
Component - EPA 8260B	AWQS	Units							
Acetone	NE	ug/L	NA	NA	NA	<20.0	NA	<20.0	<20.0
Benzene	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Bromobenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
Bromochloromethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Bromodichloromethane	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Bromoform	100	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
Bromomethane	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
2-Butanone (MEK)	NE	ug/L	NA	NA	NA	<5.00	NA	<5.00	<5.00
MTBE	NE	ug/L	NA	NA	NA	<2.00	NA	<2.00	<2.00
n-Butylbenzene	NE	ug/L	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50
sec-Butylbenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
tert-Butylbenzene	NE	ug/L	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50
Carbon Disulfide	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Carbon Tetrachloride	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Chlorobenzene	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Chloroethane	NE	ug/L	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00
Chloroform	100	ug/L	**1.12**	<0.500	<0.500	<0.500	<0.500	<0.500	**0.720**
Chloromethane	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
2-Chlorotoluene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
4-Chlorotoluene	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
p-Isopropyltoluene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
Dibromochloromethane	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,2-Dibromo-3-chloropropane	0.2	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
1,2-Dibromoethane (EDB)	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Dibromomethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,2-Dichlorobenzene	600	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
1,3-Dichlorobenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
1,4-Dichlorobenzene	75	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
Dichlorodifluoromethane	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
1,1-Dichloroethane (1,1-DCA)	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,2-Dichloroethane	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,1-Dichloroethene (1,1-DCE)	7	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
cis-1,2-Dichloroethene	70	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
trans-1,2-Dichloroethene	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,2-Dichloropropane	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,3-Dichloropropane	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
2,2-Dichloropropane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,1-Dichloropropene	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
cis-1,3-Dichloropropene	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
trans-1,3-Dichloropropene	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Ethylbenzene	700	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
Hexachlorobutadiene	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
2-Hexanone	NE	ug/L	NA	NA	NA	<5.00	NA	<5.00	<5.00
Isopropylbenzene	NE	ug/L	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50
Methylene chloride	NE	ug/L	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00
Methyl Iodide	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
4-Methyl-2-pentanone (MIBK)	NE	ug/L	NA	NA	NA	<5.00	NA	<5.00	<5.00
Napthalene	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
n-Propylbenzene	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
Styrene	100	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
1,1,1,2-Tetrachloroethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,1,2,2-Tetrachloroethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Tetrachloroethene (PCE)	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	**1.04**
Toluene	1000	ug/L	<2.00	<2.00	<2.00	<2.0	<2.00	<2.0	<2.0
1,2,3-Trichlorobenzene	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
1,2,4-Trichlorobenzene	70	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
1,1,1-Trichloroethane (TCA)	200	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
1,1,2-Trichloroethane	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Trichloroethene (TCE)	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	**0.650**	**2.75**
Trichlorofluoromethane (CFC 11)	NE	ug/L	<2.00	<2.00	<2.00	<2.0	<2.00	<2.0	<2.0
1,2,3-Trichloropropane	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
1,2,4-Trimethylbenzene	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
1,3,5-Trimethylbenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
o-Xylene	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
m,p-Xylenes	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
Vinyl Acetate	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
Vinyl Chloride	2	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Xylenes, Total	10000	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
1,4-Dioxane	NE	ug/L	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00
Total Chromium	0.1	mg/l	NA	NA	NA	**0.0136**	NA	<0.0100	**0.0172**
Dissolved Chromium	0.1	mg/l	NA	NA	NA	<0.0100	NA	<0.0100	<0.0100

Explanation:

NE - Not Established; NA - Not Analyzed

Shading indicates AWQS equaled or exceeded

(S) - data suspect

(J) - estimated value

(ND) considered not detected due to field blank cont

SYNERGY ENVIRONMENTAL, LLC

TABLE 1. SUMMARY OF WATER QUALITY - ADEQ MONITOR WELLS, MARCH 2013
West Van Buren Area WQARF Site

WVBA WELL ID			**AVB106-02**	**AVB107-01**	**AVB108-01**	**AVB108-02**	**AVB112-05**	**AVB115-01**	**AVB 116-01**
Sample ID (last three digits identify sample depth)			AVB106-0200-24177	AVB107-0100-22118	AVB108-0100-25148	AVB108-0200-18225	AVB112-0500-12160	AVB115-0100-19127	AVB116-0100-19134
Date Collected			3/15/13	3/25/13	3/20/13	3/20/13	3/20/13	3/22/13	3/22/13
Owner/Facility			MARICOPA COUNTY	TRANSCON (TRANS03-01)	VOPAK	VOPAK	ADEQ	ADEQ	ADEQ
Facility Well No.			MC-N06 #2	MW-2	MW-6	MW-11	MW-5	AVB115-01	AVB 116-01
Sample Type			PDB	PDB	PURGE	PDB	PURGE	PDB	PDB
ADWR No.			55-549233-03	55-525469	55-531539	55-562746	55-200601	55-596920	55-596916
Alluvial Unit			UAU1	UAU1	UAU1	UAU1	UAU1	UAU1	UAU1
Lab ID No.			**459337-002**	**459871-007**	**459592-002**	**459592-004**	**459592-005**	**459692-002**	**459692-007**
Component - EPA 8260B	AWQS	Units							
Acetone	NE	ug/L	NA	NA	<20.0	<20.0	<20.0	NA	NA
Benzene	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Bromobenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
Bromochloromethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Bromodichloromethane	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Bromoform	100	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
Bromomethane	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
2-Butanone (MEK)	NE	ug/L	NA	NA	<5.00	<5.00	<5.00	NA	NA
MTBE	NE	ug/L	NA	NA	<2.00	<2.00	<2.00	NA	NA
n-Butylbenzene	NE	ug/L	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50
sec-Butylbenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
tert-Butylbenzene	NE	ug/L	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50
Carbon Disulfide	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Carbon Tetrachloride	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Chlorobenzene	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Chloroethane	NE	ug/L	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00
Chloroform	100	ug/L	<0.500	**3.39**	**3.61**	**9.73**	<0.500	**1.20**	<0.500
Chloromethane	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
2-Chlorotoluene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
4-Chlorotoluene	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
p-Isopropyltoluene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
Dibromochloromethane	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,2-Dibromo-3-chloropropane	0.2	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
1,2-Dibromoethane (EDB)	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Dibromomethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,2-Dichlorobenzene	600	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
1,3-Dichlorobenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
1,4-Dichlorobenzene	75	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
Dichlorodifluoromethane	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
1,1-Dichloroethane (1,1-DCA)	NE	ug/L	<0.500	**2.49**	**0.620**	<0.500	<0.500	**4.14 (J)**	**0.790 (J)**
1,2-Dichloroethane	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,1-Dichloroethene (1,1-DCE)	7	ug/L	<0.500	**3.27**	<0.500	<0.500	<0.500	**6.02**	<0.500
cis-1,2-Dichloroethene	70	ug/L	<0.500	**5.21**	**0.900**	<0.500	<0.500	**8.90**	**0.660**
trans-1,2-Dichloroethene	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,2-Dichloropropane	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,3-Dichloropropane	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
2,2-Dichloropropane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,1-Dichloropropene	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
cis-1,3-Dichloropropene	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
trans-1,3-Dichloropropene	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Ethylbenzene	700	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
Hexachlorobutadiene	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
2-Hexanone	NE	ug/L	NA	NA	<5.00	<5.00	<5.00	NA	NA
Isopropylbenzene	NE	ug/L	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50
Methylene chloride	NE	ug/L	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00
Methyl Iodide	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
4-Methyl-2-pentanone (MIBK)	NE	ug/L	NA	NA	<5.00	<5.00	<5.00	NA	NA
Napthalene	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
n-Propylbenzene	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
Styrene	100	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
1,1,1,2-Tetrachloroethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,1,2,2-Tetrachloroethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Tetrachloroethene (PCE)	5	ug/L	<0.500	**3.53**	**10.3**	**3.24**	<0.500	**1.51**	<0.500
Toluene	1000	ug/L	<2.00	<2.00	<2.0	<2.0	<2.0	<2.00	<2.00
1,2,3-Trichlorobenzene	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
1,2,4-Trichlorobenzene	70	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
1,1,1-Trichloroethane (TCA)	200	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
1,1,2-Trichloroethane	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Trichloroethene (TCE)	5	ug/L	<0.500	**20.1**	**12.9**	**2.77**	<0.500	**40.8**	**3.51**
Trichlorofluoromethane (CFC 11)	NE	ug/L	<2.00	<2.00	<2.0	<2.0	<2.0	<2.00	<2.00
1,2,3-Trichloropropane	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
1,2,4-Trimethylbenzene	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
1,3,5-Trimethylbenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
o-Xylene	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
m,p-Xylenes	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
Vinyl Acetate	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
Vinyl Chloride	2	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Xylenes, Total	10000	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
1,4-Dioxane	NE	ug/L	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00
Total Chromium	0.1	mg/l	NA	NA	**0.0268**	NA	**0.0185**	NA	NA
Dissolved Chromium	0.1	mg/l	NA	NA	<0.0100	NA	**0.0106**	NA	NA

Explanation:

NE - Not Established; NA - Not Analyzed

Shading indicates AWQS equaled or exceeded

(S) - data suspect

(J) - estimated value

(ND) considered not detected due to field blank cont

SYNERGY ENVIRONMENTAL, LLC

TABLE 1. SUMMARY OF WATER QUALITY - ADEQ MONITOR WELLS, MARCH 2013
West Van Buren Area WQARF Site

WVBA WELL ID			**AVB117-01**	**AVB119-01**	**AVB120-01**	**AVB121-01**	**AVB122-01**	**AVB122-02**	**AVB 123-01**
Sample ID (last three digits identify sample depth)			AVB117-0100-19149	AVB119-0100-19144	AVB120-0100-19120	AVB121-0100-19132	AVB122-0100-19152	AVB122-0200-19245	AVB123-0100-17148
Date Collected			3/26/13	3/26/13	3/22/13	3/22/13	3/25/13	3/25/13	3/22/13
Owner/Facility			ADEQ	ADEQ	ADEQ	ADEQ	ADEQ	ADEQ	ADEQ
Facility Well No.			AVB117-01	AVB119-01	AVB120-01	AVB121-01	AVB122-01	AVB122-02	AVB 123-01
Sample Type			PDB	PDB	PDB	PDB	PDB	PDB	PDB
ADWR No.			55-596917	55-596918	55-596919	55-596921	55-596931	55-596932	55-202185
Alluvial Unit			UAU1	UAU1	UAU1	UAU1	UAU1	UAU1	UAU1
Lab ID No.			**459938-005**	**459938-009**	**459692-015**	**459871-008**	**459871-009**	**459871-010**	**459692-003**
Component - EPA 8260B	AWQS	Units							
Acetone	NE	ug/L	NA	NA	NA	NA	NA	NA	NA
Benzene	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Bromobenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
Bromochloromethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Bromodichloromethane	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Bromoform	100	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
Bromomethane	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
2-Butanone (MEK)	NE	ug/L	NA	NA	NA	NA	NA	NA	NA
MTBE	NE	ug/L	NA	NA	NA	NA	NA	NA	NA
n-Butylbenzene	NE	ug/L	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50
sec-Butylbenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
tert-Butylbenzene	NE	ug/L	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50
Carbon Disulfide	NE	ug/L	<0.500	<0.500	<0.500	<0.500	**0.630**	<0.500	<0.500
Carbon Tetrachloride	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Chlorobenzene	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Chloroethane	NE	ug/L	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00
Chloroform	100	ug/L	**1.96**	<0.500	**3.00**	<0.500	**4.77**	**2.12**	<0.500
Chloromethane	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
2-Chlorotoluene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
4-Chlorotoluene	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
p-Isopropyltoluene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
Dibromochloromethane	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,2-Dibromo-3-chloropropane	0.2	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
1,2-Dibromoethane (EDB)	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Dibromomethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,2-Dichlorobenzene	600	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
1,3-Dichlorobenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
1,4-Dichlorobenzene	75	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
Dichlorodifluoromethane	NE	ug/L	**2.17**	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
1,1-Dichloroethane (1,1-DCA)	NE	ug/L	<0.500	<0.500	**3.11 (J)**	<0.500	<0.500	<0.500	<0.500
1,2-Dichloroethane	5	ug/L	<0.500	<0.500	**0.500**	<0.500	<0.500	<0.500	<0.500
1,1-Dichloroethene (1,1-DCE)	7	ug/L	<0.500	<0.500	**4.32**	<0.500	**0.930**	**2.13**	<0.500
cis-1,2-Dichloroethene	70	ug/L	<0.500	<0.500	**12.3**	<0.500	**0.560**	<0.500	**1.03**
trans-1,2-Dichloroethene	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,2-Dichloropropane	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,3-Dichloropropane	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
2,2-Dichloropropane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,1-Dichloropropene	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
cis-1,3-Dichloropropene	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
trans-1,3-Dichloropropene	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Ethylbenzene	700	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
Hexachlorobutadiene	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
2-Hexanone	NE	ug/L	NA	NA	NA	NA	NA	NA	NA
Isopropylbenzene	NE	ug/L	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50
Methylene chloride	NE	ug/L	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00
Methyl Iodide	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
4-Methyl-2-pentanone (MIBK)	NE	ug/L	NA	NA	NA	NA	NA	NA	NA
Napthalene	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
n-Propylbenzene	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
Styrene	100	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
1,1,1,2-Tetrachloroethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,1,2,2-Tetrachloroethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Tetrachloroethene (PCE)	5	ug/L	**1.72**	**87.5**	**9.53**	<0.500	**13.4**	**8.83**	**0.710**
Toluene	1000	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
1,2,3-Trichlorobenzene	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
1,2,4-Trichlorobenzene	70	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
1,1,1-Trichloroethane (TCA)	200	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
1,1,2-Trichloroethane	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Trichloroethene (TCE)	5	ug/L	**0.620**	<0.500	**74.0**	<0.500	**9.13**	**7.49**	**7.47**
Trichlorofluoromethane (CFC 11)	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
1,2,3-Trichloropropane	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
1,2,4-Trimethylbenzene	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
1,3,5-Trimethylbenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
o-Xylene	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
m,p-Xylenes	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
Vinyl Acetate	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
Vinyl Chloride	2	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Xylenes, Total	10000	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
1,4-Dioxane	NE	ug/L	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00
Total Chromium	0.1	mg/l	NA	NA	NA	NA	NA	NA	NA
Dissolved Chromium	0.1	mg/l	NA	NA	NA	NA	NA	NA	NA

Explanation:

NE - Not Established; NA - Not Analyzed

Shading indicates AWQS equaled or exceeded

(S) - data suspect

(J) - estimated value

(ND) considered not detected due to field blank cont

SYNERGY ENVIRONMENTAL, LLC

TABLE 1. SUMMARY OF WATER QUALITY - ADEQ MONITOR WELLS, MARCH 2013
West Van Buren Area WQARF Site

WVBA WELL ID			**AVB 125-01**	**AVB126-01**	**AVB127-01**	**AVB 129-01**	**AVB 130-01**	**AVB 133-01**	**AVB134-01**
Sample ID (last three digits identify sample depth)			AVB125-0100-17148	AVB126-0100-13142	AVB127-0100-16140	AVB129-0100-17152	AVB130-0100-17159	AVB133-0100-14200	AVB134-0100-12120
Date Collected			3/18/13	3/19/13	3/22/13	3/25/13	3/26/13	3/8/13	3/22/13
Owner/Facility			ADEQ	ADEQ	ADEQ	ADEQ	ADEQ	ADEQ	ADEQ
Facility Well No.			AVB 125-01	AVB126-01	AVB127-01	AVB 129-01	AVB 130-01	AVB 133-01	AVB134-01
Sample Type			PURGE	PURGE	PDB	PDB	PDB	PURGE	PDB
ADWR No.			55-202189	55-211115	55-202279	55-202280	55-202188	55-207162	55-211113
Alluvial Unit			UAU1	UAU1	UAU1	UAU1	UAU1	UAU1	UAU1
Lab ID No.			**459346-011**	**459504-005**	**459692-010**	**459871-017**	**459938-008**	**458918-002**	**459692-011**
Component - EPA 8260B	AWQS	Units							
Acetone	NE	ug/L	<20.0	<20.0	NA	NA	NA	<20.0	NA
Benzene	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Bromobenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
Bromochloromethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Bromodichloromethane	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Bromoform	100	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
Bromomethane	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
2-Butanone (MEK)	NE	ug/L	<5.00	<5.00	NA	NA	NA	<5.00	NA
MTBE	NE	ug/L	<2.00	<2.00	NA	NA	NA	<2.00	NA
n-Butylbenzene	NE	ug/L	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50
sec-Butylbenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
tert-Butylbenzene	NE	ug/L	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50
Carbon Disulfide	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Carbon Tetrachloride	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Chlorobenzene	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Chloroethane	NE	ug/L	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00
Chloroform	100	ug/L	<0.500	<0.500	**4.08**	<0.500	<0.500	<0.500	**1.12**
Chloromethane	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
2-Chlorotoluene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
4-Chlorotoluene	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
p-Isopropyltoluene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
Dibromochloromethane	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,2-Dibromo-3-chloropropane	0.2	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
1,2-Dibromoethane (EDB)	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Dibromomethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,2-Dichlorobenzene	600	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
1,3-Dichlorobenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
1,4-Dichlorobenzene	75	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
Dichlorodifluoromethane	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
1,1-Dichloroethane (1,1-DCA)	NE	ug/L	<0.500	**0.660**	**1.44 (J)**	<0.500	<0.500	<0.500	**8.62 (J)**
1,2-Dichloroethane	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,1-Dichloroethene (1,1-DCE)	7	ug/L	<0.500	<0.500	**1.31**	<0.500	<0.500	<0.500	**13.3**
cis-1,2-Dichloroethene	70	ug/L	<0.500	**3.56**	**6.20**	<0.500	<0.500	<0.500	**18.9**
trans-1,2-Dichloroethene	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,2-Dichloropropane	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,3-Dichloropropane	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
2,2-Dichloropropane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,1-Dichloropropene	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
cis-1,3-Dichloropropene	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
trans-1,3-Dichloropropene	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Ethylbenzene	700	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
Hexachlorobutadiene	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
2-Hexanone	NE	ug/L	<5.00	<5.00	NA	NA	NA	<5.00	NA
Isopropylbenzene	NE	ug/L	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50
Methylene chloride	NE	ug/L	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00
Methyl Iodide	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
4-Methyl-2-pentanone (MIBK)	NE	ug/L	<5.00	<5.00	NA	NA	NA	<5.00	NA
Napthalene	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
n-Propylbenzene	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
Styrene	100	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
1,1,1,2-Tetrachloroethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,1,2,2-Tetrachloroethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Tetrachloroethene (PCE)	5	ug/L	**18.1 (J)**	**6.47**	**3.16**	<0.500	**1.40**	<0.500	**5.05**
Toluene	1000	ug/L	<2.00	<2.0	<2.00	<2.00	<2.00	**51.3 (S)**	<2.00
1,2,3-Trichlorobenzene	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
1,2,4-Trichlorobenzene	70	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
1,1,1-Trichloroethane (TCA)	200	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
1,1,2-Trichloroethane	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Trichloroethene (TCE)	5	ug/L	<0.500	**5.39**	**33.2**	<0.500	**8.40**	<0.500	**77.7**
Trichlorofluoromethane (CFC 11)	NE	ug/L	<2.00	<2.0	<2.00	<2.00	<2.00	<2.0	<2.00
1,2,3-Trichloropropane	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
1,2,4-Trimethylbenzene	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
1,3,5-Trimethylbenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
o-Xylene	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
m,p-Xylenes	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
Vinyl Acetate	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
Vinyl Chloride	2	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Xylenes, Total	10000	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
1,4-Dioxane	NE	ug/L	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00
Total Chromium	0.1	mg/l	**0.155**	**0.0163**	NA	NA	NA	<0.0100	NA
Dissolved Chromium	0.1	mg/l	**0.135**	<0.0100	NA	NA	NA	<0.0100	NA

Explanation:

NE - Not Established; NA - Not Analyzed

Shading indicates AWQS equaled or exceeded

(S) - data suspect

(J) - estimated value

(ND) considered not detected due to field blank cont

SYNERGY ENVIRONMENTAL, LLC

TABLE 1. SUMMARY OF WATER QUALITY - ADEQ MONITOR WELLS, MARCH 2013
West Van Buren Area WQARF Site

WVBA WELL ID			**AVB135-01**	**AVB140-01**	**PS-6**	**PS-7**	**PS-9**	**AVB10-02**	**AVB77-02**
Sample ID (last three digits identify sample depth)			AVB135-0100-12138	AVB140-0100-09128	PS-6	PS-7	PS-9	AVB10-0200-36290	AVB77-0200-24140
Date Collected			3/21/13	3/18/13	3/19/13	3/19/13	3/19/13	3/13/13	3/15/13
Owner/Facility			ADEQ	ADEQ	REYNOLDS	REYNOLDS	REYNOLDS	ESTRELLA BUSINESS PARK	ADEQ
Facility Well No.			AVB135-01	AVB140-01	PS-6	PS-7	PS-9	MW-2	MW-5D
Sample Type			PURGE	PURGE	PURGE	PURGE	PURGE	PURGE	PDB
ADWR No.			55-211111	55-214610	55-532037	55-545676	55-545678	55-532042	55-567443
Alluvial Unit			UAU1	UAU1	UAU1	UAU1	UAU1	UAU2	UAU2
Lab ID No.			**459683-008**	**459346-007**	**459504-011**	**459504-010**	**459504-009**	**459172-005**	**459337-007**
Component - EPA 8260B	AWQS	Units							
Acetone	NE	ug/L	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	NA
Benzene	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Bromobenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
Bromochloromethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Bromodichloromethane	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Bromoform	100	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
Bromomethane	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
2-Butanone (MEK)	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	NA
MTBE	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	NA
n-Butylbenzene	NE	ug/L	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50
sec-Butylbenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
tert-Butylbenzene	NE	ug/L	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50
Carbon Disulfide	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Carbon Tetrachloride	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Chlorobenzene	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Chloroethane	NE	ug/L	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00
Chloroform	100	ug/L	<0.500	<0.500	**3.55**	<0.500	**3.37**	<0.500	<0.500
Chloromethane	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
2-Chlorotoluene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
4-Chlorotoluene	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
p-Isopropyltoluene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
Dibromochloromethane	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,2-Dibromo-3-chloropropane	0.2	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
1,2-Dibromoethane (EDB)	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Dibromomethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,2-Dichlorobenzene	600	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
1,3-Dichlorobenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
1,4-Dichlorobenzene	75	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
Dichlorodifluoromethane	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
1,1-Dichloroethane (1,1-DCA)	NE	ug/L	<0.500	<0.500	<0.500	<0.500	**0.500**	<0.500	<0.500
1,2-Dichloroethane	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,1-Dichloroethene (1,1-DCE)	7	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
cis-1,2-Dichloroethene	70	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
trans-1,2-Dichloroethene	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,2-Dichloropropane	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,3-Dichloropropane	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
2,2-Dichloropropane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,1-Dichloropropene	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
cis-1,3-Dichloropropene	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
trans-1,3-Dichloropropene	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Ethylbenzene	700	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
Hexachlorobutadiene	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
2-Hexanone	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	NA
Isopropylbenzene	NE	ug/L	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50
Methylene chloride	NE	ug/L	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00
Methyl Iodide	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
4-Methyl-2-pentanone (MIBK)	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	NA
Napthalene	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
n-Propylbenzene	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
Styrene	100	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
1,1,1,2-Tetrachloroethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,1,2,2-Tetrachloroethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Tetrachloroethene (PCE)	5	ug/L	<0.500	<0.500	**0.660 (J)**	<0.500	**1.33**	**7.54**	<0.500
Toluene	1000	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	**5.50 (S)**	<2.00
1,2,3-Trichlorobenzene	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
1,2,4-Trichlorobenzene	70	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
1,1,1-Trichloroethane (TCA)	200	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
1,1,2-Trichloroethane	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Trichloroethene (TCE)	5	ug/L	<0.500	<0.500	**1.14 (J)**	<0.500	**5.23**	**2.33**	<0.500
Trichlorofluoromethane (CFC 11)	NE	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.00	<2.00
1,2,3-Trichloropropane	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
1,2,4-Trimethylbenzene	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
1,3,5-Trimethylbenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
o-Xylene	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
m,p-Xylenes	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
Vinyl Acetate	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
Vinyl Chloride	2	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	**0.980**
Xylenes, Total	10000	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
1,4-Dioxane	NE	ug/L	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00
Total Chromium	0.1	mg/l	**0.0754**	**0.0175**	**0.0411**	<0.0100	**0.0437**	<0.0100	NA
Dissolved Chromium	0.1	mg/l	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	NA

Explanation:

NE - Not Established; NA - Not Analyzed

Shading indicates AWQS equaled or exceeded

(S) - data suspect

(J) - estimated value

(ND) considered not detected due to field blank cont

SYNERGY ENVIRONMENTAL, LLC

TABLE 1. SUMMARY OF WATER QUALITY - ADEQ MONITOR WELLS, MARCH 2013
West Van Buren Area WQARF Site

WVBA WELL ID			**AVB81-01**	**AVB91-02**	**AVB96-02**	**AVB98-01**	**AVB106-03**	**AVB 116-02**	**AVB120-02**
Sample ID (last three digits identify sample depth)			AVB81-0100-23295	AVB91-0200-21291	AVB96-0200-21332	AVB98-0100-21287	AVB106-0300-24100	AVB116-0200-17205	AVB120-0200-19245
Date Collected			3/25/13	3/26/13	3/26/13	3/25/13	3/15/13	3/22/13	3/22/13
Owner/Facility			ADEQ	ADEQ	ADEQ	ADEQ	MARICOPA COUNTY	ADEQ	ADEQ
Facility Well No.			AVB81-01	AVB91-02	AVB96-02	AVB98-01	MC-N06 #3	AVB 116-02	AVB120-02
Sample Type			PDB	PDB	PDB	PDB	PDB	PDB	PDB
ADWR No.			55-584503	55-589644	55-589643	55-589645	55-549233	55-202187	55-596922
Alluvial Unit			UAU2	UAU2	UAU2	UAU2	UAU2	UAU2	UAU2
Lab ID No.			**459871-012**	**459938-015**	**459938-013**	**459871-014**	**459337-003**	**459692-006**	**459692-014**
Component - EPA 8260B	AWQS	Units							
Acetone	NE	ug/L	NA	NA	NA	NA	NA	NA	NA
Benzene	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Bromobenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
Bromochloromethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Bromodichloromethane	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Bromoform	100	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
Bromomethane	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
2-Butanone (MEK)	NE	ug/L	NA	NA	NA	NA	NA	NA	NA
MTBE	NE	ug/L	NA	NA	NA	NA	NA	NA	NA
n-Butylbenzene	NE	ug/L	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50
sec-Butylbenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
tert-Butylbenzene	NE	ug/L	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50
Carbon Disulfide	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Carbon Tetrachloride	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Chlorobenzene	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Chloroethane	NE	ug/L	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00
Chloroform	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Chloromethane	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
2-Chlorotoluene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
4-Chlorotoluene	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
p-Isopropyltoluene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
Dibromochloromethane	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,2-Dibromo-3-chloropropane	0.2	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
1,2-Dibromoethane (EDB)	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Dibromomethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,2-Dichlorobenzene	600	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
1,3-Dichlorobenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
1,4-Dichlorobenzene	75	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
Dichlorodifluoromethane	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	**4.63**
1,1-Dichloroethane (1,1-DCA)	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	**2.40 (J)**	<0.500
1,2-Dichloroethane	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,1-Dichloroethene (1,1-DCE)	7	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	**3.48**	<0.500
cis-1,2-Dichloroethene	70	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	**2.66**	<0.500
trans-1,2-Dichloroethene	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,2-Dichloropropane	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,3-Dichloropropane	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
2,2-Dichloropropane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,1-Dichloropropene	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
cis-1,3-Dichloropropene	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
trans-1,3-Dichloropropene	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Ethylbenzene	700	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
Hexachlorobutadiene	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
2-Hexanone	NE	ug/L	NA	NA	NA	NA	NA	NA	NA
Isopropylbenzene	NE	ug/L	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50
Methylene chloride	NE	ug/L	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00
Methyl Iodide	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
4-Methyl-2-pentanone (MIBK)	NE	ug/L	NA	NA	NA	NA	NA	NA	NA
Napthalene	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
n-Propylbenzene	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
Styrene	100	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
1,1,1,2-Tetrachloroethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,1,2,2-Tetrachloroethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Tetrachloroethene (PCE)	5	ug/L	<0.500	**3.13**	<0.500	<0.500	<0.500	<0.500	**35.5**
Toluene	1000	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
1,2,3-Trichlorobenzene	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
1,2,4-Trichlorobenzene	70	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
1,1,1-Trichloroethane (TCA)	200	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
1,1,2-Trichloroethane	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Trichloroethene (TCE)	5	ug/L	<0.500	**1.24**	<0.500	<0.500	<0.500	**12.3**	**130**
Trichlorofluoromethane (CFC 11)	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
1,2,3-Trichloropropane	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
1,2,4-Trimethylbenzene	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
1,3,5-Trimethylbenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
o-Xylene	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
m,p-Xylenes	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
Vinyl Acetate	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
Vinyl Chloride	2	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Xylenes, Total	10000	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
1,4-Dioxane	NE	ug/L	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00
Total Chromium	0.1	mg/l	NA	NA	NA	NA	NA	NA	NA
Dissolved Chromium	0.1	mg/l	NA	NA	NA	NA	NA	NA	NA

Explanation:

NE - Not Established; NA - Not Analyzed

Shading indicates AWQS equaled or exceeded

(S) - data suspect

(J) - estimated value

(ND) considered not detected due to field blank cont

SYNERGY ENVIRONMENTAL, LLC

TABLE 1. SUMMARY OF WATER QUALITY - ADEQ MONITOR WELLS, MARCH 2013
West Van Buren Area WQARF Site

WVBA WELL ID			**AVB121-02**	**AVB 122-03**	**AVB 124-01**	**AVB 124-02**	**AVB126-02**	**AVB 128-01**	**AVB129-02**
Sample ID (last three digits identify sample depth)			AVB121-0200-11240	AVB122-0300-16330	AVB124-0100-17215	AVB124-0200-14270	AVB126-0200-12230	AVB128-0100-17279	AVB129-0200-16310
Date Collected			3/12/13	3/12/13	3/22/13	3/11/13	3/8/13	3/25/13	3/25/13
Owner/Facility			ADEQ	ADEQ	ADEQ	ADEQ	ADEQ	ADEQ	ADEQ
Facility Well No.			AVB121-02	AVB 122-03	AVB 124-01	AVB 124-02	AVB126-02	AVB 128-01	AVB129-02
Sample Type			PDB	PURGE	PDB	PURGE	PURGE	PDB	PDB
ADWR No.			55-596932	55-202186	55-202184	55-207163	55-211114	55-202283	55-202282
Alluvial Unit			UAU2	UAU2	UAU2	UAU2	UAU2	UAU2	UAU2
Lab ID No.			**459063-002**	**459063-005**	**459692-004**	**459007-002**	**458918-003**	**459871-006**	**459871-016**
Component - EPA 8260B	AWQS	Units							
Acetone	NE	ug/L	<20.0	<20.0	NA	<20.0	<20.0	NA	NA
Benzene	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Bromobenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
Bromochloromethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Bromodichloromethane	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Bromoform	100	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
Bromomethane	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
2-Butanone (MEK)	NE	ug/L	<5.00	<5.00	NA	<5.00	<5.00	NA	NA
MTBE	NE	ug/L	<2.00	<2.00	NA	<2.00	<2.00	NA	NA
n-Butylbenzene	NE	ug/L	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50
sec-Butylbenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
tert-Butylbenzene	NE	ug/L	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50
Carbon Disulfide	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Carbon Tetrachloride	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Chlorobenzene	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Chloroethane	NE	ug/L	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00
Chloroform	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	**3.08**	<0.500
Chloromethane	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
2-Chlorotoluene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
4-Chlorotoluene	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
p-Isopropyltoluene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
Dibromochloromethane	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,2-Dibromo-3-chloropropane	0.2	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
1,2-Dibromoethane (EDB)	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Dibromomethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,2-Dichlorobenzene	600	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
1,3-Dichlorobenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
1,4-Dichlorobenzene	75	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
Dichlorodifluoromethane	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
1,1-Dichloroethane (1,1-DCA)	NE	ug/L	<0.500	<0.500	**3.53 (J)**	<0.500	**0.99**	<0.500	<0.500
1,2-Dichloroethane	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,1-Dichloroethene (1,1-DCE)	7	ug/L	<0.500	<0.500	**13.4**	<0.500	**3.31**	<0.500	<0.500
cis-1,2-Dichloroethene	70	ug/L	<0.500	<0.500	**16.7**	<0.500	**2.53**	<0.500	<0.500
trans-1,2-Dichloroethene	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,2-Dichloropropane	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,3-Dichloropropane	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
2,2-Dichloropropane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,1-Dichloropropene	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
cis-1,3-Dichloropropene	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
trans-1,3-Dichloropropene	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Ethylbenzene	700	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
Hexachlorobutadiene	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
2-Hexanone	NE	ug/L	<5.00	<5.00	NA	<5.00	<5.00	NA	NA
Isopropylbenzene	NE	ug/L	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50
Methylene chloride	NE	ug/L	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00
Methyl Iodide	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
4-Methyl-2-pentanone (MIBK)	NE	ug/L	<5.00	<5.00	NA	<5.00	<5.00	NA	NA
Napthalene	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
n-Propylbenzene	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
Styrene	100	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
1,1,1,2-Tetrachloroethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,1,2,2-Tetrachloroethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Tetrachloroethene (PCE)	5	ug/L	<0.500	**3.01**	**7.39**	<0.500	**1.73**	**1.44**	<0.500
Toluene	1000	ug/L	**49.1 (S)**	<2.0	<2.00	**46.8 (S)**	**6.61 (S)**	<2.00	<2.00
1,2,3-Trichlorobenzene	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
1,2,4-Trichlorobenzene	70	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
1,1,1-Trichloroethane (TCA)	200	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
1,1,2-Trichloroethane	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Trichloroethene (TCE)	5	ug/L	<0.500	**2.63**	**99.5**	<0.500	**10.6**	**1.18**	<0.500
Trichlorofluoromethane (CFC 11)	NE	ug/L	<2.0	<2.0	<2.00	<2.0	<2.0	<2.00	<2.00
1,2,3-Trichloropropane	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
1,2,4-Trimethylbenzene	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
1,3,5-Trimethylbenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
o-Xylene	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
m,p-Xylenes	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
Vinyl Acetate	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
Vinyl Chloride	2	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Xylenes, Total	10000	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
1,4-Dioxane	NE	ug/L	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00
Total Chromium	0.1	mg/l	<0.0100	<0.0100	NA	**0.0115**	**0.0341**	NA	NA
Dissolved Chromium	0.1	mg/l	<0.0100	<0.0100	NA	<0.0100	<0.0100	NA	NA

Explanation:

NE - Not Established; NA - Not Analyzed

Shading indicates AWQS equaled or exceeded

(S) - data suspect

(J) - estimated value

(ND) considered not detected due to field blank cont

SYNERGY ENVIRONMENTAL, LLC

TABLE 1. SUMMARY OF WATER QUALITY - ADEQ MONITOR WELLS, MARCH 2013
West Van Buren Area WQARF Site

WVBA WELL ID			**AVB 131-01**	**AVB132-01**	**AVB132-02**	**AVB134-02**	**AVB136-01**	**AVB137-01**	**AVB139-01**
Sample ID (last three digits identify sample depth)			AVB131-0100-14215	AVB132-0100-13210	AVB132-0200-13280	AVB134-0200-12230	AVB136-0100-12235	AVB137-0100-11260	AVB139-0100-11290
Date Collected			3/11/13	3/22/13	3/11/13	3/22/13	3/11/13	3/12/13	3/14/13
Owner/Facility			ADEQ	ADEQ	ADEQ	ADEQ	ADEQ	ADEQ	ADEQ
Facility Well No.			AVB 131-01	AVB132-01	AVB132-02	AVB134-02	AVB136-01	AVB137-01	AVB139-01
Sample Type			PURGE	PDB	PURGE	PDB	PURGE	PURGE	PURGE
ADWR No.			55-207161	55-208664	55-208663	55-211112	55-211110	55-211109	55-214809
Alluvial Unit			UAU2	UAU2	UAU2	UAU2	UAU2	UAU2	UAU2
Lab ID No.			**459007-003**	**459692-008**	**459007-004**	**459692-012**	**459007-005**	**459063-003**	**459243-003**
Component - EPA 8260B	AWQS	Units							
Acetone	NE	ug/L	<20.0	NA	<20.0	NA	<20.0	<20.0	<20.0
Benzene	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Bromobenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
Bromochloromethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Bromodichloromethane	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Bromoform	100	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
Bromomethane	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
2-Butanone (MEK)	NE	ug/L	<5.00	NA	<5.00	NA	<5.00	<5.00	<5.00
MTBE	NE	ug/L	<2.00	NA	<2.00	NA	<2.00	<2.00	<2.00
n-Butylbenzene	NE	ug/L	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50
sec-Butylbenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
tert-Butylbenzene	NE	ug/L	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50
Carbon Disulfide	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Carbon Tetrachloride	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Chlorobenzene	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Chloroethane	NE	ug/L	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00
Chloroform	100	ug/L	**7.13**	**1.08 (J)**	<0.500	**1.38**	<0.500	<0.500	<0.500
Chloromethane	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
2-Chlorotoluene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
4-Chlorotoluene	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
p-Isopropyltoluene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
Dibromochloromethane	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,2-Dibromo-3-chloropropane	0.2	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
1,2-Dibromoethane (EDB)	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Dibromomethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,2-Dichlorobenzene	600	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
1,3-Dichlorobenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
1,4-Dichlorobenzene	75	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
Dichlorodifluoromethane	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
1,1-Dichloroethane (1,1-DCA)	NE	ug/L	<0.500	**10.4 (J)**	<0.500	**10.3 (J)**	<0.500	<0.500	<0.500
1,2-Dichloroethane	5	ug/L	<0.500	<0.500	<0.500	**0.500**	<0.500	<0.500	<0.500
1,1-Dichloroethene (1,1-DCE)	7	ug/L	<0.500	**23.1**	<0.500	**24.5**	**2.13**	<0.500	<0.500
cis-1,2-Dichloroethene	70	ug/L	<0.500	**31.7**	<0.500	**27.6**	**3.62**	<0.500	<0.500
trans-1,2-Dichloroethene	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,2-Dichloropropane	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,3-Dichloropropane	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
2,2-Dichloropropane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,1-Dichloropropene	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
cis-1,3-Dichloropropene	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
trans-1,3-Dichloropropene	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Ethylbenzene	700	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
Hexachlorobutadiene	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
2-Hexanone	NE	ug/L	<5.00	NA	<5.00	NA	<5.00	<5.00	<5.00
Isopropylbenzene	NE	ug/L	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50
Methylene chloride	NE	ug/L	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00
Methyl Iodide	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
4-Methyl-2-pentanone (MIBK)	NE	ug/L	<5.00	NA	<5.00	NA	<5.00	<5.00	<5.00
Napthalene	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
n-Propylbenzene	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
Styrene	100	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
1,1,1,2-Tetrachloroethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,1,2,2-Tetrachloroethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Tetrachloroethene (PCE)	5	ug/L	**4.26**	**8.36**	<0.500	**9.88**	**8.66**	<0.500	<0.500
Toluene	1000	ug/L	**5.42 (S)**	<2.00	**43.8 (S)**	<2.00	**16.1 (S)**	<2.0	<2.0
1,2,3-Trichlorobenzene	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
1,2,4-Trichlorobenzene	70	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
1,1,1-Trichloroethane (TCA)	200	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
1,1,2-Trichloroethane	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Trichloroethene (TCE)	5	ug/L	**0.083**	**177**	**1.24**	**168**	**16.9**	<0.500	<0.500
Trichlorofluoromethane (CFC 11)	NE	ug/L	<2.0	<2.00	<2.0	<2.00	<2.0	<2.0	<2.0
1,2,3-Trichloropropane	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
1,2,4-Trimethylbenzene	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
1,3,5-Trimethylbenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
o-Xylene	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
m,p-Xylenes	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
Vinyl Acetate	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
Vinyl Chloride	2	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Xylenes, Total	10000	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
1,4-Dioxane	NE	ug/L	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00
Total Chromium	0.1	mg/l	<0.0100	NA	<0.0100	NA	**0.0177**	**0.0118**	**0.019 (J)**
Dissolved Chromium	0.1	mg/l	<0.0100	NA	<0.0100	NA	<0.0100	<0.0100	<0.0100

Explanation:

NE - Not Established; NA - Not Analyzed

Shading indicates AWQS equaled or exceeded

(S) - data suspect

(J) - estimated value

(ND) considered not detected due to field blank cont

SYNERGY ENVIRONMENTAL, LLC

TABLE 1. SUMMARY OF WATER QUALITY - ADEQ MONITOR WELLS, MARCH 2013
West Van Buren Area WQARF Site

WVBA WELL ID			**AVB141-01**	**AVB142-01**	**AVB69-01**	**AVB60-01**	**AVB61-01**	**AVB68-04**	**AVB82-01**
Sample ID (last three digits identify sample depth)			AVB141-0100-11285	AVB142-0100-09335	AVB69-0100-25255	AVB60-0100-31473	AVB61-0100-30450	AVB68-0400-24255	AVB82-0100-22327
Date Collected			3/14/13	3/12/13	3/15/13	3/25/13	3/14/13	3/25/13	3/13/13
Owner/Facility			ADEQ	ADEQ	ADEQ	ADEQ NSW	ADEQ SSW	ADEQ	ADEQ
Facility Well No.			AVB141-01	AVB142-01	MW-2	AVB60-01	AVB61-01	MW-3	AVB82-01
Sample Type			PURGE	PURGE	PDB	PDB	PURGE	PDB	PDB
ADWR No.			55-214609	55-217206	55-562052	55-543717	55-546228	55-561940	55-584504
Alluvial Unit			UAU2	UAU2	UAU2/MAU	MAU	MAU	MAU	MAU
Lab ID No.			**459243-002**	**459063-006**	**459337-012**	**459871-015**	**459243-005**	**459871-003**	**459172-003**
Component - EPA 8260B	AWQS	Units							
Acetone	NE	ug/L	<20.0	<20.0	NA	NA	**174**	NA	**24.4**
Benzene	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Bromobenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
Bromochloromethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Bromodichloromethane	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Bromoform	100	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
Bromomethane	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
2-Butanone (MEK)	NE	ug/L	<5.00	<5.00	NA	NA	<5.00	NA	<5.00
MTBE	NE	ug/L	<2.00	<2.00	NA	NA	<2.00	NA	<2.00
n-Butylbenzene	NE	ug/L	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50
sec-Butylbenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
tert-Butylbenzene	NE	ug/L	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50
Carbon Disulfide	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Carbon Tetrachloride	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Chlorobenzene	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Chloroethane	NE	ug/L	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00
Chloroform	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Chloromethane	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
2-Chlorotoluene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
4-Chlorotoluene	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
p-Isopropyltoluene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
Dibromochloromethane	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,2-Dibromo-3-chloropropane	0.2	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
1,2-Dibromoethane (EDB)	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Dibromomethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,2-Dichlorobenzene	600	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
1,3-Dichlorobenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
1,4-Dichlorobenzene	75	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
Dichlorodifluoromethane	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
1,1-Dichloroethane (1,1-DCA)	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,2-Dichloroethane	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,1-Dichloroethene (1,1-DCE)	7	ug/L	<0.500	**2.53**	<0.500	<0.500	<0.500	<0.500	**29.4**
cis-1,2-Dichloroethene	70	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	**1.52**
trans-1,2-Dichloroethene	100	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,2-Dichloropropane	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,3-Dichloropropane	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
2,2-Dichloropropane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,1-Dichloropropene	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
cis-1,3-Dichloropropene	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
trans-1,3-Dichloropropene	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Ethylbenzene	700	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
Hexachlorobutadiene	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
2-Hexanone	NE	ug/L	<5.00	<5.00	NA	NA	<5.00	NA	<5.00
Isopropylbenzene	NE	ug/L	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50	<2.50
Methylene chloride	NE	ug/L	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00	<3.00
Methyl Iodide	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
4-Methyl-2-pentanone (MIBK)	NE	ug/L	<5.00	<5.00	NA	NA	<5.00	NA	<5.00
Napthalene	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
n-Propylbenzene	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
Styrene	100	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
1,1,1,2-Tetrachloroethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
1,1,2,2-Tetrachloroethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Tetrachloroethene (PCE)	5	ug/L	<0.500	**7.34**	<0.500	<0.500	<0.500	<0.500	**70.2**
Toluene	1000	ug/L	**52.3 (S)**	<2.0	<2.00	<2.00	**179 (S)**	<2.00	<2.0
1,2,3-Trichlorobenzene	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
1,2,4-Trichlorobenzene	70	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
1,1,1-Trichloroethane (TCA)	200	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
1,1,2-Trichloroethane	5	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Trichloroethene (TCE)	5	ug/L	<0.500	**3.11**	<0.500	<0.500	<0.500	<0.500	**21.2**
Trichlorofluoromethane (CFC 11)	NE	ug/L	<2.0	<2.0	<2.00	<2.00	<2.0	<2.00	**4.81**
1,2,3-Trichloropropane	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
1,2,4-Trimethylbenzene	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
1,3,5-Trimethylbenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
o-Xylene	NE	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
m,p-Xylenes	NE	ug/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
Vinyl Acetate	NE	ug/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
Vinyl Chloride	2	ug/L	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Xylenes, Total	10000	ug/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
1,4-Dioxane	NE	ug/L	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00
Total Chromium	0.1	mg/l	**0.0106**	<0.0100	NA	NA	**0.109**	NA	NA
Dissolved Chromium	0.1	mg/l	<0.0100	<0.0100	NA	NA	<0.0100	NA	NA

Explanation:

NE - Not Established; NA - Not Analyzed

Shading indicates AWQS equaled or exceeded

(S) - data suspect

(J) - estimated value

(ND) considered not detected due to field blank cont

SYNERGY ENVIRONMENTAL, LLC

TABLE 1. SUMMARY OF WATER QUALITY - ADEQ MONITOR WELLS, MARCH 2013
West Van Buren Area WQARF Site

WVBA WELL ID			**AVB82-02**	**AVB91-03**	**AVB120-03**	**AVB126-03**
Sample ID (last three digits identify sample depth)			AVB82-0200-10410	AVB91-0300-10360	AVB120-0300-08235	AVB126-0300-11325
Date Collected			3/13/13	3/13/13	3/22/13	3/8/13
Owner/Facility			ADEQ	ADEQ	ADEQ	ADEQ
Facility Well No.			AVB82-02	AVB91-03	AVB120-03	AVB126-03
Sample Type			PURGE	PURGE	PURGE	PURGE
ADWR No.			55-214608	55-214616	55-217205	55-214611
Alluvial Unit			MAU	MAU	MAU	MAU
Lab ID No.			**459172-004**	**459172-002**	**459692-013**	**458918-004**
Component - EPA 8260B	AWQS	Units				
Acetone	NE	ug/L	<20.0	<20.0	NA	<20.0
Benzene	5	ug/L	<0.500	<0.500	<0.500	<0.500
Bromobenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50
Bromochloromethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500
Bromodichloromethane	100	ug/L	<0.500	<0.500	<0.500	<0.500
Bromoform	100	ug/L	<1.00	<1.00	<1.00	<1.00
Bromomethane	NE	ug/L	<5.00	<5.00	<5.00	<5.00
2-Butanone (MEK)	NE	ug/L	<5.00	<5.00	NA	<5.00
MTBE	NE	ug/L	<2.00	<2.00	NA	<2.00
n-Butylbenzene	NE	ug/L	<2.50	<2.50	<2.50	<2.50
sec-Butylbenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50
tert-Butylbenzene	NE	ug/L	<2.50	<2.50	<2.50	<2.50
Carbon Disulfide	NE	ug/L	<0.500	<0.500	<0.500	<0.500
Carbon Tetrachloride	5	ug/L	<0.500	<0.500	<0.500	<0.500
Chlorobenzene	100	ug/L	<0.500	<0.500	<0.500	<0.500
Chloroethane	NE	ug/L	<4.00	<4.00	<4.00	<4.00
Chloroform	100	ug/L	<0.500	<0.500	<0.500	<0.500
Chloromethane	NE	ug/L	<5.00	<5.00	<5.00	<5.00
2-Chlorotoluene	NE	ug/L	<1.50	<1.50	<1.50	<1.50
4-Chlorotoluene	NE	ug/L	<2.00	<2.00	<2.00	<2.00
p-Isopropyltoluene	NE	ug/L	<1.50	<1.50	<1.50	<1.50
Dibromochloromethane	100	ug/L	<0.500	<0.500	<0.500	<0.500
1,2-Dibromo-3-chloropropane	0.2	ug/L	<2.00	<2.00	<2.00	<2.00
1,2-Dibromoethane (EDB)	NE	ug/L	<0.500	<0.500	<0.500	<0.500
Dibromomethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500
1,2-Dichlorobenzene	600	ug/L	<1.50	<1.50	<1.50	<1.50
1,3-Dichlorobenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50
1,4-Dichlorobenzene	75	ug/L	<1.50	<1.50	<1.50	<1.50
Dichlorodifluoromethane	NE	ug/L	<2.00	<2.00	<2.00	<2.00
1,1-Dichloroethane (1,1-DCA)	NE	ug/L	<0.500	<0.500	<0.500	<0.500
1,2-Dichloroethane	5	ug/L	<0.500	<0.500	<0.500	<0.500
1,1-Dichloroethene (1,1-DCE)	7	ug/L	<0.500	<0.500	<0.500	<0.500
cis-1,2-Dichloroethene	70	ug/L	<0.500	<0.500	<0.500	<0.500
trans-1,2-Dichloroethene	100	ug/L	<0.500	<0.500	<0.500	<0.500
1,2-Dichloropropane	5	ug/L	<0.500	<0.500	<0.500	<0.500
1,3-Dichloropropane	NE	ug/L	<1.00	<1.00	<1.00	<1.00
2,2-Dichloropropane	NE	ug/L	<0.500	<0.500	<0.500	<0.500
1,1-Dichloropropene	NE	ug/L	<1.00	<1.00	<1.00	<1.00
cis-1,3-Dichloropropene	NE	ug/L	<1.00	<1.00	<1.00	<1.00
trans-1,3-Dichloropropene	NE	ug/L	<0.500	<0.500	<0.500	<0.500
Ethylbenzene	700	ug/L	<2.00	<2.00	<2.00	<2.00
Hexachlorobutadiene	NE	ug/L	<5.00	<5.00	<5.00	<5.00
2-Hexanone	NE	ug/L	<5.00	<5.00	NA	<5.00
Isopropylbenzene	NE	ug/L	<2.50	<2.50	<2.50	<2.50
Methylene chloride	NE	ug/L	<3.00	<3.00	<3.00	<3.00
Methyl Iodide	NE	ug/L	<2.00	<2.00	<2.00	<2.00
4-Methyl-2-pentanone (MIBK)	NE	ug/L	<5.00	<5.00	NA	<5.00
Napthalene	NE	ug/L	<5.00	<5.00	**67.7**	<5.00
n-Propylbenzene	NE	ug/L	<2.00	<2.00	<2.00	<2.00
Styrene	100	ug/L	<1.00	<1.00	<1.00	<1.00
1,1,1,2-Tetrachloroethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500
1,1,2,2-Tetrachloroethane	NE	ug/L	<0.500	<0.500	<0.500	<0.500
Tetrachloroethene (PCE)	5	ug/L	**7.06**	<0.500	<0.500	<0.500
Toluene	1000	ug/L	**46.7 (S)**	<2.0	<2.00	**24.1 (S)**
1,2,3-Trichlorobenzene	NE	ug/L	<5.00	<5.00	<5.00	<5.00
1,2,4-Trichlorobenzene	70	ug/L	<5.00	<5.00	<5.00	<5.00
1,1,1-Trichloroethane (TCA)	200	ug/L	<5.00	<5.00	<5.00	<5.00
1,1,2-Trichloroethane	5	ug/L	<0.500	<0.500	<0.500	<0.500
Trichloroethene (TCE)	5	ug/L	<0.500	<0.500	**1.03**	<0.500
Trichlorofluoromethane (CFC 11)	NE	ug/L	<2.00	<2.0	<2.00	<2.0
1,2,3-Trichloropropane	NE	ug/L	<1.00	<1.00	<1.00	<1.00
1,2,4-Trimethylbenzene	NE	ug/L	<2.00	<2.00	<2.00	<2.00
1,3,5-Trimethylbenzene	NE	ug/L	<1.50	<1.50	<1.50	<1.50
o-Xylene	NE	ug/L	<1.00	<1.00	<1.00	<1.00
m,p-Xylenes	NE	ug/L	<2.00	<2.00	<2.00	<2.00
Vinyl Acetate	NE	ug/L	<5.00	<5.00	<5.00	<5.00
Vinyl Chloride	2	ug/L	<0.500	<0.500	<0.500	<0.500
Xylenes, Total	10000	ug/L	<1.00	<1.00	<1.00	<1.00
1,4-Dioxane	NE	ug/L	<4.00	<4.00	<4.00	<4.00
Total Chromium	0.1	mg/l	**0.0169**	**0.0140**	NA	**0.0342**
Dissolved Chromium	0.1	mg/l	**0.0132 (ND)**	<0.0100	NA	**0.0104**

Explanation:

NE - Not Established; NA - Not Analyzed

Shading indicates AWQS equaled or exceeded

(S) - data suspect

(J) - estimated value

(ND) considered not detected due to field blank cont

SYNERGY ENVIRONMENTAL, LLC

TABLE 2. SUMMARY OF WATER QUALITY - RID PRODUCTION WELLS

West Van Buren Area WQARF Site

TCE

Sample Date	RID Well Number																																		
	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	111R	112	113	114
Jun-03	NS	NS	8.8	0.57	NS	NS	NS	33	NS	NS	92	NS	7.1	51	NS	NS	NS	2.3	63	NS	NS	NS	NS	1.0	14	13	9.4	13	3.4	IO		5.5	19	98
Jun-04	NS	NS	5.9	ND	NS	NS	NS	28	NS	NS	84	NS	NS	62	NS	NS	NS	1.7	42	NS	1.1	ND	1.5	ND	15	13	4.5	11	2.5	IO		6.7	26	79
Sep-05	NS	NS	1.4	NS	ND	NS	ND	31	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.65	NS	13	3.0	9.3	NS	IO		13	NS	99
Dec-06	NS	NS	2.1	ND	ND	NS	ND	NS	NS	NS	79	0.87	0.76	47	NS	ND	NS	0.51	18	NS	0.62	ND	1.2	0.55	14	NS	3.1	7.4	2.7	IO		14	37	110
Mar-08	NS	NS	NS	ND	ND	NS	ND	23	NS	NS	71	ND	NS	55	NS	ND	NS	ND	20	NS	0.72	NS	1.1	ND	13	NS	2.3	7.8	2.1	IO		8.1	18	90
Sep-08	NS	NS	1.4	ND	ND	NS	ND	32	NS	NS	85	ND	0.81	56	NS	ND	NS	0.71	34	ND	ND	ND	1.2	0.58	NS	11	3.2	7.7	1.8	IO		19	NS	85
Jun-10	NS	ND	1.2	ND	NS	NS	NS	32	NS	NS	84	NS	ND	57	NS	NS	NS	ND	NS	NS	0.72	ND	0.79	0.57	10	9.5	2.6	6.5	1.9	IO		17	NS	87
Apr-11	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	ND	NS	NS	NS	NS	ND	NS	NS	NS	NS	NS	0.51	8.6	7.4	2.4	5.5	1.5	IO		12	29	74
Sep-11	NS	ND	1.11	NS	ND	NS	NS	27.5	NS	1.07	65.3	1.02	0.67	52.3	NS	NS	NS	ND	14.9	NS	NS	NS	NS	0.52	7.49	7.1	2.98	6.25	1.31	IO		10.3	19.1	52.8
Sep-12	NS	NS	1.22	NS	ND	NS	NS	26.4	NS	2.63	63.9	1.85	ND	60.2	NS	NS	NS	ND	15.8	NS	NS	NS	ND	0.56	7.66	6.30	2.89	6.58	0.80	IO	ND	6.33	5.31	44.1
Apr-13	NS	NS	1.09	NS	ND	NS	ND	34.1	ND	2.99	73.5	1.17	0.88	54.4	NS	NS	NS	ND	9.38	ND	ND	ND	ND	0.55	NS	7.82	3.10	6.92	1.21	IO	ND	6.40	8.14	48.6
Sep-13	1.00	NS	1.38	ND	ND	ND	ND	37.5	0.74	4.13	86.4	2.14	1.24	59.6	NS	NS	NS	ND	12.6	ND	ND	ND	ND	0.54	8.43	6.73	3.94	5.93	1.10	IO	0.60	6.39	5.86	39.0
Mar-14	1.22	NS	1.26	ND	ND	ND	ND	35.5	0.63	1.11	76.2	1.05	0.65	44.0	NS	NS	NS	ND	8.97	ND	ND	ND	ND	0.59	8.06	8.11	2.69	7.15	1.53	IO	ND	NS	8.24	45.6

PCE

Sample Date	RID Well Number																																		
	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	111R	112	113	114
Jun-03	NS	NS	52	4.5	NS	NS	NS	12	NS	NS	28	NS	5.0	7.1	NS	NS	NS	18	15	NS	NS	NS	NS	5.8	28	15	15	10	11	IO		8.6	6.0	5.3
Jun-04	NS	NS	51	1.7	NS	NS	NS	12	NS	NS	29	NS	NS	7.7	NS	NS	NS	11	9.7	NS	12	ND	12	4.5	45	18	12	10	11	IO		6.7	6.2	4.4
Sep-05	NS	NS	10	NS	ND	NS	ND	10	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	4.6	NS	13	7.8	7.8	NS	IO		5.3	NS	5.0
Dec-06	NS	NS	18	0.56	ND	NS	ND	NS	NS	NS	20	ND	1.1	5.3	NS	ND	NS	12	8.8	NS	18	ND	17	4.5	45	NS	11	9.2	11	IO		5.3	4.5	6.3
Mar-08	NS	NS	NS	ND	ND	NS	ND	9.3	NS	NS	20	ND	NS	5.3	NS	ND	NS	14	9.3	NS	15	NS	10	4.1	39	NS	12	6.5	10	IO		4.8	4.2	5.0
Sep-08	NS	NS	10	ND	ND	NS	ND	11	NS	NS	19	ND	1.2	5.2	NS	ND	NS	7.9	7.8	ND	12	ND	7.5	3.9	NS	13	10	8.5	7.7	IO		4.5	NS	4.6
Jun-10	NS	ND	8.8	ND	NS	NS	NS	8.7	NS	NS	17	NS	0.69	5.0	NS	NS	NS	7.0	NS	NS	17	ND	6.0	3.4	27	10	8.7	6.9	7.9	IO		4.5	NS	4.3
Apr-11	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.87	NS	NS	NS	NS	7.3	NS	NS	NS	NS	NS	3.0	21	6.8	7.6	6.0	6.5	IO		3.0	2.8	3.9
Sep-11	NS	ND	7.8	NS	ND	NS	NS	7.99	NS	ND	12.3	0.60	1.15	4.04	NS	NS	NS	5.63	5.77	NS	NS	NS	NS	3.01	23.4	7.9	6.78	5.42	6.33	IO		2.98	2.8	3.1
Sep-12	NS	NS	7.25	NS	ND	NS	NS	8.03	NS	ND	12.5	0.53	1.20	4.12	NS	NS	NS	3.80	4.13	NS	NS	NS	3.11	2.61	21.1	5.38	5.19	4.94	6.38	IO	0.97	1.78	1.79	2.61
Apr-13	NS	NS	6.91	NS	ND	NS	ND	11.0	ND	ND	14.7	ND	0.59	3.44	NS	NS	NS	8.85	4.72	ND	5.36	ND	4.20	2.56	NS	4.43	6.24	6.65	6.85	IO	0.63	2.01	1.92	2.20
Sep-13	2.95	NS	8.16	ND	ND	ND	ND	11.7	ND	1.36	14.5	1.01	1.58	3.71	NS	NS	NS	5.38	3.11	ND	4.01	ND	ND	2.54	22.1	5.31	3.92	9.41	5.72	IO	1.52	2.59	2.53	2.63
Mar-14	3.53	NS	8.04	ND	ND	ND	ND	10.3	ND	ND	13.5	0.63	1.34	2.99	NS	NS	NS	8.31	3.25	ND	3.86	ND	3.38	2.39	21.5	5.95	4.90	10.6	8.16	IO	1.53	NS	3.03	2.86

1,1-DCE

Sample Date	RID Well Number																																		
	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	111R	112	113	114
Jun-03	NS	NS	7.6	1.9	NS	NS	NS	4.1	NS	NS	3.5	NS	1.9	3.4	NS	NS	NS	1.1	21	NS	NS	NS	NS	2.4	11	9.0	3.0	5.4	1.9	IO		ND	ND	2.4
Jun-04	NS	NS	5.2	ND	NS	NS	NS	3.4	NS	NS	4.0	NS	NS	5.5	NS	NS	NS	1.3	15	NS	ND	1.8	1.7	ND	13	7.5	1.9	5.2	ND	IO		ND	1.4	3.0
Sep-05	NS	NS	1.1	NS	ND	NS	ND	2.9	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	6.5	ND	3.5	NS	IO		ND	NS	3.9
Dec-06	NS	NS	1.4	ND	ND	NS	ND	NS	NS	NS	4.2	ND	1.2	7.6	NS	ND	NS	2.5	7.8	NS	ND	2.2	1.2	0.98	9.0	NS	0.98	3.5	ND	IO		0.71	1.8	5.4
Mar-08	NS	NS	NS	ND	ND	NS	ND	1.9	NS	NS	2.7	ND	NS	6.4	NS	ND	NS	1.2	6.0	NS	0.50	NS	1.2	ND	7.4	NS	ND	2.7	ND	IO		ND	ND	2.5
Sep-08	NS	NS	0.99	ND	ND	NS	ND	3.2	NS	NS	4.4	ND	0.98	6.9	NS	ND	NS	2.0	9.3	2.0	ND	1.6	1.0	0.78	NS	4.7	0.98	3.2	ND	IO		0.91	NS	3.7
Jun-10	NS	ND	0.76	ND	NS	NS	NS	2.7	NS	NS	4.4	NS	0.85	8.4	NS	NS	NS	1.4	NS	NS	ND	1.4	0.76	0.66	5.7	3.6	0.84	3.0	ND	IO		0.76	NS	5.5
Apr-11	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.87	NS	NS	NS	NS	1.1	NS	NS	NS	NS	NS	0.68	5.0	2.9	0.88	2.9	ND	IO		0.64	2.5	4.7
Sep-11	NS	ND	0.94	NS	ND	NS	NS	2.75	NS	ND	4.36	ND	0.94	7.24	NS	NS	NS	1.22	3.99	NS	NS	NS	NS	0.67	5.09	2.61	0.96	2.74	ND	IO		0.57	1.88	3.73
Sep-12	NS	NS	0.98	NS	ND	NS	NS	2.39	NS	0.58	4.68	0.57	ND	7.33	NS	NS	NS	ND	3.29	NS	NS	NS	ND	0.68	3.82	1.25	ND	2.08	ND	IO	ND	ND	ND	1.71
Apr-13	NS	NS	ND	NS	ND	NS	ND	2.39	ND	ND	5.17	ND	ND	9.23	NS	NS	NS	ND	1.89	ND	ND	ND	ND	ND	NS	0.81	ND	1.76	ND	IO	ND	ND	ND	3.33
Sep-13	0.96	NS	1.14	ND	ND	ND	ND	3.14	ND	0.80	6.22	0.51	1.04	7.52	NS	NS	NS	0.56	3.56	1.04	ND	0.64	0.56	0.68	5.63	2.45	0.65	1.93	ND	IO	ND	0.51	0.50	2.50
Mar-14	1.14	NS	1.08	ND	ND	ND	ND	2.84	ND	ND	4.84	ND	1.03	6.18	NS	NS	NS	0.50	2.51	1.14	ND	ND	ND	ND	4.66	2.38	ND	2.60	ND	IO	ND	NS	0.52	3.01

EXPLANATION:

All numeric values presented in micrograms per liter (µg/L)

NS = Not Sampled

ND = Non-detect result (typically less than reporting limit of 0.50 µg/L)

COCs = Contaminants of Concern

X.X = Meets or exceeds MCL & AWQS.

IO = Well was inoperable.

SYNERGY ENVIRONMENTAL, LLC

TABLE 3. CHROMIUM DATA SUMMARY

West Van Buren Area WQARF Site

WELL ID	Sample Date	Total Chromium (as µg/l)	Hexavlent Chromium (as µg/l)	Dissolved Chromium (as µg/l)
RID-82	3/28/14	**14.7**	**14.0**	**14.4**
RID-83	NS	---	---	---
RID-84	3/28/14	<10.0	**6.0**	<10.0
RID-85	3/28/14	<10.0	<5.0	<10.0
RID-86	3/28/14	<10.0	<5.0	<10.0
RID-87	3/28/14	<10.0	<5.0	<10.0
RID-88	3/27/14	<10.0	<5.0	<10.0
RID-89	3/27/14	<10.0	<5.0	<10.0
RID-90	3/27/14	<10.0	<5.0	<10.0
RID-91	3/27/14	<10.0	<5.0	<10.0
RID-92	3/27/14	<10.0	<5.0	<10.0
RID-93	3/27/14	<10.0	<5.0	<10.0
RID-94	3/27/14	<10.0	<5.0	<10.0
RID-95	3/27/14	<10.0	**6.0**	<10.0
RID-96	NS	---	---	---
RID-97	NS	---	---	---
RID-98	NS	---	---	---
RID-99	3/27/14	**48.1**	**43.0**	**14.4**
RID-100	3/27/14	<10.0	<5.0	<10.0
RID-101	3/27/14	<10.0	<5.0	<10.0
RID-102	3/27/14	**16.1**	**13.0**	**15.7**
RID-103	3/27/14	<10.0	<5.0	<10.0
RID-104	3/27/14	<10.0	<5.0	<10.0
RID-105	3/27/14	**13.0**	**12.0**	**13.4**
RID-106	3/27/14	<10.0	**7.0**	<10.0
RID-107	3/27/14	<10.0	**6.0**	<10.0
RID-108	3/27/14	<10.0	**9.0**	<10.0
RID-109	3/27/14	<10.0	**9.0**	<10.0
RID-110	3/27/14	<10.0	<5.0	<10.0
RID-111R	3/27/14	<10.0	<5.0	<10.0
RID-112	Offline	---	---	---
RID-113	3/27/14	<10.0	<5.0	<10.0
RID-114	3/27/14	<10.0	<5.0	<10.0

EXPLANATION:

µg/l = micrograms per liter

NS = Well was not sampled per Arizona Department of Environmental Quality.

Offline = Well was offline during the sampling round.

SYNERGY ENVIRONMENTAL, LLC

TABLE 4. ESTIMATED COSTS OF REMEDIAL ALTERNATIVES

West Van Buren Area WQARF Site

Costs Summary:	Capital Cost	Annual O&M
Reference Remedy	$13,645,000	$2,956,900
Less Aggressive	$9,445,000	$2,049,500
More Aggressive	$14,623,000	$2,192,600
Most Aggressive	$19,460,000	$4,169,900

Reference Remedy

Well	Description	Capital Cost	Annual O&M	Comments/Explanation
89	3 skids GAC treatment	$1,500,000	$300,000	Modified Early Response Action (ERA)
92	2 skids GAC treatment	$1,000,000	$200,000	Modified ERA + supplemental action
95	2 skids GAC treatment	$1,000,000	$250,000	Modified ERA (increased O&M with higher concentration of 1,1-dichloroethene, resulting in quicker breakthrough)
114	3 skids GAC treatment	$1,500,000	$300,000	Modified ERA
100	2 skids GAC treatment	$1,000,000	$200,000	Modified ERA
106	3 skids GAC treatment	$1,500,000	$300,000	Modified ERA
109	2 skids GAC treatment	$1,000,000	$200,000	Modified ERA
112	2 skids GAC treatment	$1,000,000	$200,000	Modified ERA
84	2 skids GAC treatment	$1,000,000	$200,000	Supplemental Action
	volatilization control	$180,000		sealing wellhead discharge boxes @ sites with COCs greater than MCLs & enclose open lateral south of RID-92
	groundwater monitoring		$134,000	based on Fiscal Year 2015 budget estimate by Terranext
	Salt Canal improvements	$750,000		2 open section + manholes (1,500 feet @ $500/foot)
	restore lost production capacity	$1,215,000		1) re-drill, new pump, same motor at RID-92 2) re-drill, new pump, new motor at RID-106 3) new pump, same motor at RID-114
	power penalty		$210,000	estimated offset for increased pumping cost through wellhead treatment from increase in operating pressure ($10,000/skid/year)
	equipment repair and/or replacement		$315,000	3% of capital equipment costs
	real estate acquisition	$1,000,000		92, 100, 106, 109, 112 ($200,000/site)
	project administration and reporting		$147,900	6.0% of annual O&M (excludes power penalty and groundwater monitoring)
	TOTALS:	**$13,645,000**	**$2,956,900**	

TABLE 4. ESTIMATED COSTS OF REMEDIAL ALTERNATIVES

West Van Buren Area WQARF Site

Less Aggressive

Well	Description	Capital Cost	Annual O&M	Comments/Explanation
89	3 skids GAC treatment	$1,500,000	$300,000	Modified ERA
92	1 skid GAC treatment	$1,000,000	$100,000	Modified ERA
95	2 skids GAC treatment	$1,000,000	$250,000	Modified ERA (increased O&M with higher concentration of 1,1-dichloroethene, resulting in quicker breakthrough)
114	3 skids GAC treatment	$1,500,000	$300,000	Modified ERA
106	3 skids GAC treatment	$1,500,000	$300,000	Modified ERA + supplemental action
109	2 skids GAC treatment	$1,000,000	$200,000	Modified ERA
84	off-season injection	TBD	TBD	operation of pumps and filtration (contingengy; If > MCLs after 2 years of remedy)
	volatilization control	$180,000		sealing wellhead discharge boxes @ sites with COCs greater than MCLs & enclose open lateral south of RID-92
	groundwater monitoring		$134,000	based on Fiscal Year 2015 budget estimate by Terranext
	Salt Canal improvements	$750,000		2 open section + manholes (1,500 feet @ $500/foot)
	restore lost production capacity	$615,000		1) re-drill, new pump, new motor at RID-106 2) new pump, same motor at RID-114
	power penalty		$140,000	estimated offset for increased pumping cost through wellhead treatment from increase in operating pressure ($10,000/skid/year)
	equipment repair and/or replacement		$225,000	3% of capital equipment costs
	real estate acquisition	$400,000		106, 109 ($200,000/site)
	project administration and reporting		$100,500	6.0% of annual O&M (excludes power penalty and groundwater monitoring)
	TOTALS:	**$9,445,000**	**$2,049,500**	

TABLE 4. ESTIMATED COSTS OF REMEDIAL ALTERNATIVES

West Van Buren Area WQARF Site

More Aggressive

Well	Description	Capital Cost	Annual O&M	Comments/Explanation
89	3 skids GAC treatment	$1,500,000	$300,000	Modified ERA
92	1 skids GAC treatment	$1,000,000	$100,000	Modified ERA
95	2 skids GAC treatment	$1,000,000	$250,000	Modified ERA (increased O&M with higher concentration of 1,1-dichloroethene, resulting in quicker breakthrough)
114	3 skids GAC treatment	$1,500,000	$300,000	Modified ERA
106	3 skids GAC treatment	$1,500,000	$300,000	Modified ERA + supplemental action
109	2 skids GAC treatment	$1,000,000	$200,000	Modified ERA
84, 85, 90, 91, 93	Injection of treated and reclaimed water during low-demand period	$5,178,000	$135,000	Capital Cost: lift pump, filters, piping, flow control valving, instrumentation and controls, system design (engineering and hydrology) Annual O&M: pumping/filtration
	volatilization control	$180,000		sealing wellhead discharge boxes @ sites with COCs greater than MCLs & enclose open lateral south of RID-92
	groundwater monitoring		$134,000	based on Fiscal Year 2015 budget estimate by Terranext
	Salt Canal improvements	$750,000		2 open section + manholes (1,500 feet @ $500/foot)
	restore lost production capacity	$615,000		1) re-drill, new pump, new motor at RID-106 2) new pump, same motor at RID-114
	power penalty		$140,000	estimated offset for increased pumping cost through wellhead treatment from increase in operating pressure ($10,000/skid/year)
	equipment repair and/or replacement		$225,000	3% of capital equipment costs
	real estate acquisition	$400,000		106, 109 ($200,000/site)
	project administration and reporting		$108,600	6.0% of annual O&M (excl. power penalty and groundwater monitoring)
	TOTALS:	**$14,623,000**	**$2,192,600**	

TABLE 4. ESTIMATED COSTS OF REMEDIAL ALTERNATIVES

West Van Buren Area WQARF Site

Most Aggressive

Well	Description	Capital Cost	Annual O&M	Comments/Explanation
89	3 skids GAC treatment	$1,500,000	$300,000	Modified ERA
92	2 skids GAC treatment	$1,000,000	$200,000	Modified ERA
95	2 skids GAC treatment	$1,000,000	$250,000	Modified ERA (increased O&M with higher concentration of 1,1-dichloroethene, resulting in quicker breakthrough)
114	3 skids GAC treatment	$1,500,000	$300,000	Modified ERA
100	2 skids GAC treatment	$1,000,000	$200,000	Modified ERA
106	3 skids GAC treatment	$1,500,000	$300,000	Modified ERA + supplemental action
107	2 skids GAC treatment	$1,000,000	$200,000	Supplemental Action
109	2 skids GAC treatment	$1,000,000	$200,000	Modified ERA
110	3 skids GAC treatment	$1,500,000	$300,000	Supplemental Action
112	2 skids GAC treatment	$1,000,000	$200,000	Modified ERA
113	2 skids GAC treatment	$1,000,000	$200,000	Modified ERA
84	3 skids GAC treatment	$1,500,000	$200,000	Supplemental Action
99	2 skids GAC treatment	$1,000,000	$200,000	Supplemental Action
	volatilization control	$180,000		sealing wellhead discharge boxes @ sites with COCs greater than MCLs & enclose open lateral south of RID-92
	groundwater monitoring		$134,000	based on Fiscal Year 2015 budget estimate by Terranext
	Salt Canal improvements	$750,000		2 open section + manholes (1,500 feet @ $500/foot)
	restore lost production capacity	$1,230,000		1) new pump, same motor at RID-84 2) re-drill, new pump, same motor at RID-92 3) re-drill, new pump, new motor at RID-106 4) new pump, same motor at RID-114
	power penalty		$310,000	estimated offset for increased pumping cost through wellhead treatment from increase in operating pressure ($10,000/skid/year)
	equipment repair and/or replacement		$465,000	3% of capital equipment costs
	real estate acquisition	$1,800,000		92, 99, 100, 106, 107, 109, 110, 112, 113 ($200,000/site)
	project administration and reporting		$210,900	6.0% of annual O&M (excludes power penalty and groundwater monitoring)
	TOTALS:	**$19,460,000**	**$4,169,900**	

TABLE 5. COMPARATIVE COST OF REMEDIAL ALTERNATIVES
NET PRESENT VALUE ANALYSIS
West Van Buren Area WQARF Site

Reference Remedy

Discount Factor to Present Value = *3%*

Year	Year	Capital Costs	Annual O&M Costs	Total Costs	Annual Discount Factor	Total Present Value Cost	Cumulative Present Value Cost
2015	0	$ 13,645,000	$ 2,956,900	$ 16,601,900	1	$ 16,601,900	$ 16,601,900
2016	1		$ 2,956,900	$ 2,956,900	0.971	$ 2,870,777	$ 19,472,677
2017	2		$ 2,956,900	$ 2,956,900	0.943	$ 2,787,162	$ 22,259,839
2018	3		$ 2,956,900	$ 2,956,900	0.915	$ 2,705,982	$ 24,965,821
2019	4		$ 2,956,900	$ 2,956,900	0.888	$ 2,627,167	$ 27,592,988
2020	5		$ 2,956,900	$ 2,956,900	0.863	$ 2,550,648	$ 30,143,636
2021	6		$ 2,956,900	$ 2,956,900	0.837	$ 2,476,357	$ 32,619,993
2022	7		$ 2,956,900	$ 2,956,900	0.813	$ 2,404,230	$ 35,024,224
2023	8		$ 2,956,900	$ 2,956,900	0.789	$ 2,334,204	$ 37,358,428
2024	9		$ 2,956,900	$ 2,956,900	0.766	$ 2,266,218	$ 39,624,645
2025	10		$ 2,956,900	$ 2,956,900	0.744	$ 2,200,211	$ 41,824,857
2026	11		$ 2,956,900	$ 2,956,900	0.722	$ 2,136,127	$ 43,960,984
2027	12		$ 2,956,900	$ 2,956,900	0.701	$ 2,073,910	$ 46,034,894
2028	13		$ 2,956,900	$ 2,956,900	0.681	$ 2,013,505	$ 48,048,399
2029	14		$ 2,956,900	$ 2,956,900	0.661	$ 1,954,859	$ 50,003,259
2030	15		$ 2,956,900	$ 2,956,900	0.642	$ 1,897,922	$ 51,901,180
2031	16		$ 2,956,900	$ 2,956,900	0.623	$ 1,842,642	$ 53,743,823
2032	17		$ 2,956,900	$ 2,956,900	0.605	$ 1,788,973	$ 55,532,796
2033	18		$ 2,956,900	$ 2,956,900	0.587	$ 1,736,867	$ 57,269,663
2034	19		$ 2,956,900	$ 2,956,900	0.570	$ 1,686,279	$ 58,955,942
2035	20		$ 2,956,900	$ 2,956,900	0.554	$ 1,637,164	$ 60,593,105
2036	21		$ 2,956,900	$ 2,956,900	0.538	$ 1,589,479	$ 62,182,585
2037	22		$ 2,956,900	$ 2,956,900	0.522	$ 1,543,184	$ 63,725,769
2038	23		$ 2,956,900	$ 2,956,900	0.507	$ 1,498,237	$ 65,224,006
2039	24		$ 2,956,900	$ 2,956,900	0.492	$ 1,454,599	$ 66,678,605
2040	25		$ 2,956,900	$ 2,956,900	0.478	$ 1,412,232	$ 68,090,836
2041	26		$ 2,956,900	$ 2,956,900	0.464	$ 1,371,099	$ 69,461,935
2042	27		$ 2,956,900	$ 2,956,900	0.450	$ 1,331,164	$ 70,793,099
2043	28		$ 2,956,900	$ 2,956,900	0.437	$ 1,292,392	$ 72,085,492
2044	29		$ 2,956,900	$ 2,956,900	0.424	$ 1,254,750	$ 73,340,241
2045	30		$ 2,956,900	$ 2,956,900	0.412	$ 1,218,204	$ 74,558,445
2046	31		$ 2,956,900	$ 2,956,900	0.400	$ 1,182,722	$ 75,741,167
2047	32		$ 2,956,900	$ 2,956,900	0.388	$ 1,148,274	$ 76,889,441

TABLE 5. COMPARATIVE COST OF REMEDIAL ALTERNATIVES
NET PRESENT VALUE ANALYSIS
West Van Buren Area WQARF Site

Reference Remedy (Continued)

Discount Factor to Present Value = 3%

Year	Year	Capital Costs	Annual O&M Costs	Total Costs	Annual Discount Factor	Total Present Value Cost	Cumulative Present Value Cost
2048	33		$ 2,956,900	$ 2,956,900	0.377	$ 1,114,829	$ 78,004,270
2049	34		$ 2,956,900	$ 2,956,900	0.366	$ 1,082,358	$ 79,086,628
2050	35		$ 2,956,900	$ 2,956,900	0.355	$ 1,050,833	$ 80,137,461
2051	36		$ 2,956,900	$ 2,956,900	0.345	$ 1,020,226	$ 81,157,687
2052	37		$ 2,956,900	$ 2,956,900	0.335	$ 990,511	$ 82,148,198
2053	38		$ 2,956,900	$ 2,956,900	0.325	$ 961,661	$ 83,109,860
2054	39		$ 2,956,900	$ 2,956,900	0.316	$ 933,652	$ 84,043,511
2055	40		$ 2,956,900	$ 2,956,900	0.307	$ 906,458	$ 84,949,969
2056	41		$ 2,956,900	$ 2,956,900	0.298	$ 880,056	$ 85,830,025
2057	42		$ 2,956,900	$ 2,956,900	0.289	$ 854,424	$ 86,684,449
2058	43		$ 2,956,900	$ 2,956,900	0.281	$ 829,537	$ 87,513,986
2059	44		$ 2,956,900	$ 2,956,900	0.272	$ 805,376	$ 88,319,363
2060	45		$ 2,956,900	$ 2,956,900	0.264	$ 781,919	$ 89,101,281
2061	46		$ 2,956,900	$ 2,956,900	0.257	$ 759,144	$ 89,860,425
2062	47		$ 2,956,900	$ 2,956,900	0.249	$ 737,033	$ 90,597,459
2063	48		$ 2,956,900	$ 2,956,900	0.242	$ 715,566	$ 91,313,025
2064	49		$ 2,956,900	$ 2,956,900	0.235	$ 694,725	$ 92,007,749
TOTALS		**$ 13,645,000**	**$ 147,845,000**	**$ 161,490,000**		**$ 92,007,749**	

SYNERGY ENVIRONMENTAL, LLC

TABLE 5. COMPARATIVE COST OF REMEDIAL ALTERNATIVES
NET PRESENT VALUE ANALYSIS
West Van Buren Area WQARF Site

Less Aggressive Remedy

Discount Factor to Present Value = 3%

Year	Year	Capital Costs	Annual O&M Costs	Total Costs	Annual Discount Factor	Total Present Value Cost	Cumulative Present Value Cost
2015	0	$ 9,445,000	$ 2,049,500	$ 11,494,500	1	$ 11,494,500	$ 11,494,500
2016	1		$ 2,049,500	$ 2,049,500	0.971	$ 1,989,806	$ 13,484,306
2017	2		$ 2,049,500	$ 2,049,500	0.943	$ 1,931,850	$ 15,416,156
2018	3		$ 2,049,500	$ 2,049,500	0.915	$ 1,875,583	$ 17,291,739
2019	4		$ 2,049,500	$ 2,049,500	0.888	$ 1,820,954	$ 19,112,693
2020	5		$ 2,049,500	$ 2,049,500	0.863	$ 1,767,917	$ 20,880,610
2021	6		$ 2,049,500	$ 2,049,500	0.837	$ 1,716,424	$ 22,597,034
2022	7		$ 2,049,500	$ 2,049,500	0.813	$ 1,666,431	$ 24,263,465
2023	8		$ 2,049,500	$ 2,049,500	0.789	$ 1,617,894	$ 25,881,359
2024	9		$ 2,049,500	$ 2,049,500	0.766	$ 1,570,771	$ 27,452,130
2025	10		$ 2,049,500	$ 2,049,500	0.744	$ 1,525,020	$ 28,977,151
2026	11		$ 2,049,500	$ 2,049,500	0.722	$ 1,480,602	$ 30,457,753
2027	12		$ 2,049,500	$ 2,049,500	0.701	$ 1,437,478	$ 31,895,231
2028	13		$ 2,049,500	$ 2,049,500	0.681	$ 1,395,610	$ 33,290,841
2029	14		$ 2,049,500	$ 2,049,500	0.661	$ 1,354,961	$ 34,645,802
2030	15		$ 2,049,500	$ 2,049,500	0.642	$ 1,315,496	$ 35,961,298
2031	16		$ 2,049,500	$ 2,049,500	0.623	$ 1,277,181	$ 37,238,479
2032	17		$ 2,049,500	$ 2,049,500	0.605	$ 1,239,981	$ 38,478,460
2033	18		$ 2,049,500	$ 2,049,500	0.587	$ 1,203,865	$ 39,682,325
2034	19		$ 2,049,500	$ 2,049,500	0.570	$ 1,168,801	$ 40,851,126
2035	20		$ 2,049,500	$ 2,049,500	0.554	$ 1,134,758	$ 41,985,885
2036	21		$ 2,049,500	$ 2,049,500	0.538	$ 1,101,707	$ 43,087,592
2037	22		$ 2,049,500	$ 2,049,500	0.522	$ 1,069,619	$ 44,157,211
2038	23		$ 2,049,500	$ 2,049,500	0.507	$ 1,038,465	$ 45,195,675
2039	24		$ 2,049,500	$ 2,049,500	0.492	$ 1,008,218	$ 46,203,894
2040	25		$ 2,049,500	$ 2,049,500	0.478	$ 978,853	$ 47,182,746
2041	26		$ 2,049,500	$ 2,049,500	0.464	$ 950,342	$ 48,133,089
2042	27		$ 2,049,500	$ 2,049,500	0.450	$ 922,662	$ 49,055,751
2043	28		$ 2,049,500	$ 2,049,500	0.437	$ 895,789	$ 49,951,540
2044	29		$ 2,049,500	$ 2,049,500	0.424	$ 869,698	$ 50,821,238
2045	30		$ 2,049,500	$ 2,049,500	0.412	$ 844,367	$ 51,665,605
2046	31		$ 2,049,500	$ 2,049,500	0.400	$ 819,774	$ 52,485,378
2047	32		$ 2,049,500	$ 2,049,500	0.388	$ 795,897	$ 53,281,275

SYNERGY ENVIRONMENTAL, LLC

TABLE 5. COMPARATIVE COST OF REMEDIAL ALTERNATIVES
NET PRESENT VALUE ANALYSIS
West Van Buren Area WQARF Site

Less Aggressive Remedy (Continued)

Discount Factor to Present Value = 3%

Year	Year	Capital Costs	Annual O&M Costs	Total Costs	Annual Discount Factor	Total Present Value Cost	Cumulative Present Value Cost
2048	33		$ 2,049,500	$ 2,049,500	0.377	$ 772,715	$ 54,053,990
2049	34		$ 2,049,500	$ 2,049,500	0.366	$ 750,209	$ 54,804,199
2050	35		$ 2,049,500	$ 2,049,500	0.355	$ 728,358	$ 55,532,558
2051	36		$ 2,049,500	$ 2,049,500	0.345	$ 707,144	$ 56,239,701
2052	37		$ 2,049,500	$ 2,049,500	0.335	$ 686,548	$ 56,926,249
2053	38		$ 2,049,500	$ 2,049,500	0.325	$ 666,551	$ 57,592,800
2054	39		$ 2,049,500	$ 2,049,500	0.316	$ 647,137	$ 58,239,937
2055	40		$ 2,049,500	$ 2,049,500	0.307	$ 628,288	$ 58,868,225
2056	41		$ 2,049,500	$ 2,049,500	0.298	$ 609,989	$ 59,478,214
2057	42		$ 2,049,500	$ 2,049,500	0.289	$ 592,222	$ 60,070,436
2058	43		$ 2,049,500	$ 2,049,500	0.281	$ 574,973	$ 60,645,408
2059	44		$ 2,049,500	$ 2,049,500	0.272	$ 558,226	$ 61,203,634
2060	45		$ 2,049,500	$ 2,049,500	0.264	$ 541,967	$ 61,745,601
2061	46		$ 2,049,500	$ 2,049,500	0.257	$ 526,182	$ 62,271,783
2062	47		$ 2,049,500	$ 2,049,500	0.249	$ 510,856	$ 62,782,639
2063	48		$ 2,049,500	$ 2,049,500	0.242	$ 495,977	$ 63,278,615
2064	49		$ 2,049,500	$ 2,049,500	0.235	$ 481,531	$ 63,760,146
TOTALS		**$ 9,380,000**	**$ 102,475,000**	**$ 111,920,000**		**$ 63,760,146**	

TABLE 5. COMPARATIVE COST OF REMEDIAL ALTERNATIVES
NET PRESENT VALUE ANALYSIS
West Van Buren Area WQARF Site

More Aggressive Remedy

Discount Factor to Present Value = 3%

Year	Year	Capital Costs	Annual O&M Costs	Total Costs	Annual Discount Factor	Total Present Value Cost	Cumulative Present Value Cost
2015	0	$ 14,623,000	$ 2,192,600	$ 16,815,600	1	$ 16,815,600	$ 16,815,600
2016	1		$ 2,192,600	$ 2,192,600	0.971	$ 2,128,738	$ 18,944,338
2017	2		$ 2,192,600	$ 2,192,600	0.943	$ 2,066,736	$ 21,011,074
2018	3		$ 2,192,600	$ 2,192,600	0.915	$ 2,006,540	$ 23,017,613
2019	4		$ 2,192,600	$ 2,192,600	0.888	$ 1,948,097	$ 24,965,710
2020	5		$ 2,192,600	$ 2,192,600	0.863	$ 1,891,356	$ 26,857,066
2021	6		$ 2,192,600	$ 2,192,600	0.837	$ 1,836,268	$ 28,693,334
2022	7		$ 2,192,600	$ 2,192,600	0.813	$ 1,782,784	$ 30,476,118
2023	8		$ 2,192,600	$ 2,192,600	0.789	$ 1,730,859	$ 32,206,977
2024	9		$ 2,192,600	$ 2,192,600	0.766	$ 1,680,445	$ 33,887,422
2025	10		$ 2,192,600	$ 2,192,600	0.744	$ 1,631,500	$ 35,518,923
2026	11		$ 2,192,600	$ 2,192,600	0.722	$ 1,583,981	$ 37,102,904
2027	12		$ 2,192,600	$ 2,192,600	0.701	$ 1,537,846	$ 38,640,749
2028	13		$ 2,192,600	$ 2,192,600	0.681	$ 1,493,054	$ 40,133,803
2029	14		$ 2,192,600	$ 2,192,600	0.661	$ 1,449,567	$ 41,583,370
2030	15		$ 2,192,600	$ 2,192,600	0.642	$ 1,407,347	$ 42,990,716
2031	16		$ 2,192,600	$ 2,192,600	0.623	$ 1,366,356	$ 44,357,072
2032	17		$ 2,192,600	$ 2,192,600	0.605	$ 1,326,559	$ 45,683,631
2033	18		$ 2,192,600	$ 2,192,600	0.587	$ 1,287,921	$ 46,971,553
2034	19		$ 2,192,600	$ 2,192,600	0.570	$ 1,250,409	$ 48,221,962
2035	20		$ 2,192,600	$ 2,192,600	0.554	$ 1,213,989	$ 49,435,951
2036	21		$ 2,192,600	$ 2,192,600	0.538	$ 1,178,631	$ 50,614,582
2037	22		$ 2,192,600	$ 2,192,600	0.522	$ 1,144,301	$ 51,758,883
2038	23		$ 2,192,600	$ 2,192,600	0.507	$ 1,110,972	$ 52,869,856
2039	24		$ 2,192,600	$ 2,192,600	0.492	$ 1,078,614	$ 53,948,470
2040	25		$ 2,192,600	$ 2,192,600	0.478	$ 1,047,198	$ 54,995,668
2041	26		$ 2,192,600	$ 2,192,600	0.464	$ 1,016,697	$ 56,012,365
2042	27		$ 2,192,600	$ 2,192,600	0.450	$ 987,085	$ 56,999,449
2043	28		$ 2,192,600	$ 2,192,600	0.437	$ 958,334	$ 57,957,784
2044	29		$ 2,192,600	$ 2,192,600	0.424	$ 930,422	$ 58,888,206
2045	30		$ 2,192,600	$ 2,192,600	0.412	$ 903,322	$ 59,791,528
2046	31		$ 2,192,600	$ 2,192,600	0.400	$ 877,012	$ 60,668,540
2047	32		$ 2,192,600	$ 2,192,600	0.388	$ 851,468	$ 61,520,007

TABLE 5. COMPARATIVE COST OF REMEDIAL ALTERNATIVES
NET PRESENT VALUE ANALYSIS
West Van Buren Area WQARF Site

More Aggressive Remedy (Continued)

Discount Factor to Present Value = 3%

Year	Year	Capital Costs	Annual O&M Costs	Total Costs	Annual Discount Factor	Total Present Value Cost	Cumulative Present Value Cost
2048	33		$ 2,192,600	$ 2,192,600	0.377	$ 826,668	$ 62,346,675
2049	34		$ 2,192,600	$ 2,192,600	0.366	$ 802,590	$ 63,149,265
2050	35		$ 2,192,600	$ 2,192,600	0.355	$ 779,214	$ 63,928,479
2051	36		$ 2,192,600	$ 2,192,600	0.345	$ 756,518	$ 64,684,997
2052	37		$ 2,192,600	$ 2,192,600	0.335	$ 734,484	$ 65,419,480
2053	38		$ 2,192,600	$ 2,192,600	0.325	$ 713,091	$ 66,132,571
2054	39		$ 2,192,600	$ 2,192,600	0.316	$ 692,321	$ 66,824,893
2055	40		$ 2,192,600	$ 2,192,600	0.307	$ 672,157	$ 67,497,049
2056	41		$ 2,192,600	$ 2,192,600	0.298	$ 652,579	$ 68,149,628
2057	42		$ 2,192,600	$ 2,192,600	0.289	$ 633,572	$ 68,783,200
2058	43		$ 2,192,600	$ 2,192,600	0.281	$ 615,118	$ 69,398,319
2059	44		$ 2,192,600	$ 2,192,600	0.272	$ 597,202	$ 69,995,521
2060	45		$ 2,192,600	$ 2,192,600	0.264	$ 579,808	$ 70,575,329
2061	46		$ 2,192,600	$ 2,192,600	0.257	$ 562,921	$ 71,138,250
2062	47		$ 2,192,600	$ 2,192,600	0.249	$ 546,525	$ 71,684,774
2063	48		$ 2,192,600	$ 2,192,600	0.242	$ 530,607	$ 72,215,381
2064	49		$ 2,192,600	$ 2,192,600	0.235	$ 515,152	$ 72,730,533
TOTALS		**$ 14,623,000**	**$ 109,630,000**	**$ 124,253,000**		**$ 72,730,533**	

TABLE 5. COMPARATIVE COST OF REMEDIAL ALTERNATIVES
NET PRESENT VALUE ANALYSIS
West Van Buren Area WQARF Site

Most Aggressive Remedy

Discount Factor to Present Value = 3%

Year	Year	Capital Costs	Annual O&M Costs	Total Costs	Annual Discount Factor	Total Present Value Cost	Cumulative Present Value Cost
2015	0	$ 19,460,000	$ 4,169,900	$ 23,629,900	1	$ 23,629,900	$ 23,629,900
2016	1		$ 4,169,900	$ 4,169,900	0.971	$ 4,048,447	$ 27,678,347
2017	2		$ 4,169,900	$ 4,169,900	0.943	$ 3,930,531	$ 31,608,877
2018	3		$ 4,169,900	$ 4,169,900	0.915	$ 3,816,049	$ 35,424,926
2019	4		$ 4,169,900	$ 4,169,900	0.888	$ 3,704,902	$ 39,129,829
2020	5		$ 4,169,900	$ 4,169,900	0.863	$ 3,596,992	$ 42,726,821
2021	6		$ 4,169,900	$ 4,169,900	0.837	$ 3,492,226	$ 46,219,047
2022	7		$ 4,169,900	$ 4,169,900	0.813	$ 3,390,510	$ 49,609,557
2023	8		$ 4,169,900	$ 4,169,900	0.789	$ 3,291,758	$ 52,901,314
2024	9		$ 4,169,900	$ 4,169,900	0.766	$ 3,195,881	$ 56,097,196
2025	10		$ 4,169,900	$ 4,169,900	0.744	$ 3,102,797	$ 59,199,993
2026	11		$ 4,169,900	$ 4,169,900	0.722	$ 3,012,424	$ 62,212,417
2027	12		$ 4,169,900	$ 4,169,900	0.701	$ 2,924,684	$ 65,137,101
2028	13		$ 4,169,900	$ 4,169,900	0.681	$ 2,839,499	$ 67,976,600
2029	14		$ 4,169,900	$ 4,169,900	0.661	$ 2,756,795	$ 70,733,395
2030	15		$ 4,169,900	$ 4,169,900	0.642	$ 2,676,500	$ 73,409,896
2031	16		$ 4,169,900	$ 4,169,900	0.623	$ 2,598,544	$ 76,008,439
2032	17		$ 4,169,900	$ 4,169,900	0.605	$ 2,522,858	$ 78,531,297
2033	18		$ 4,169,900	$ 4,169,900	0.587	$ 2,449,377	$ 80,980,674
2034	19		$ 4,169,900	$ 4,169,900	0.570	$ 2,378,036	$ 83,358,710
2035	20		$ 4,169,900	$ 4,169,900	0.554	$ 2,308,773	$ 85,667,482
2036	21		$ 4,169,900	$ 4,169,900	0.538	$ 2,241,527	$ 87,909,009
2037	22		$ 4,169,900	$ 4,169,900	0.522	$ 2,176,240	$ 90,085,249
2038	23		$ 4,169,900	$ 4,169,900	0.507	$ 2,112,854	$ 92,198,103
2039	24		$ 4,169,900	$ 4,169,900	0.492	$ 2,051,314	$ 94,249,417
2040	25		$ 4,169,900	$ 4,169,900	0.478	$ 1,991,567	$ 96,240,985
2041	26		$ 4,169,900	$ 4,169,900	0.464	$ 1,933,561	$ 98,174,545
2042	27		$ 4,169,900	$ 4,169,900	0.450	$ 1,877,243	$ 100,051,789
2043	28		$ 4,169,900	$ 4,169,900	0.437	$ 1,822,566	$ 101,874,355
2044	29		$ 4,169,900	$ 4,169,900	0.424	$ 1,769,482	$ 103,643,837
2045	30		$ 4,169,900	$ 4,169,900	0.412	$ 1,717,944	$ 105,361,780
2046	31		$ 4,169,900	$ 4,169,900	0.400	$ 1,667,906	$ 107,029,687
2047	32		$ 4,169,900	$ 4,169,900	0.388	$ 1,619,327	$ 108,649,013

TABLE 5. COMPARATIVE COST OF REMEDIAL ALTERNATIVES
NET PRESENT VALUE ANALYSIS
West Van Buren Area WQARF Site

Most Aggressive Remedy (Continued)

Discount Factor to Present Value = 3%

Year	Year	Capital Costs	Annual O&M Costs	Total Costs	Annual Discount Factor	Total Present Value Cost	Cumulative Present Value Cost
2048	33		$ 4,169,900	$ 4,169,900	0.377	$ 1,572,162	$ 110,221,175
2049	34		$ 4,169,900	$ 4,169,900	0.366	$ 1,526,371	$ 111,747,546
2050	35		$ 4,169,900	$ 4,169,900	0.355	$ 1,481,913	$ 113,229,459
2051	36		$ 4,169,900	$ 4,169,900	0.345	$ 1,438,751	$ 114,668,210
2052	37		$ 4,169,900	$ 4,169,900	0.335	$ 1,396,845	$ 116,065,055
2053	38		$ 4,169,900	$ 4,169,900	0.325	$ 1,356,161	$ 117,421,216
2054	39		$ 4,169,900	$ 4,169,900	0.316	$ 1,316,661	$ 118,737,876
2055	40		$ 4,169,900	$ 4,169,900	0.307	$ 1,278,311	$ 120,016,188
2056	41		$ 4,169,900	$ 4,169,900	0.298	$ 1,241,079	$ 121,257,267
2057	42		$ 4,169,900	$ 4,169,900	0.289	$ 1,204,931	$ 122,462,198
2058	43		$ 4,169,900	$ 4,169,900	0.281	$ 1,169,836	$ 123,632,034
2059	44		$ 4,169,900	$ 4,169,900	0.272	$ 1,135,763	$ 124,767,797
2060	45		$ 4,169,900	$ 4,169,900	0.264	$ 1,102,683	$ 125,870,479
2061	46		$ 4,169,900	$ 4,169,900	0.257	$ 1,070,566	$ 126,941,045
2062	47		$ 4,169,900	$ 4,169,900	0.249	$ 1,039,384	$ 127,980,429
2063	48		$ 4,169,900	$ 4,169,900	0.242	$ 1,009,111	$ 128,989,540
2064	49		$ 4,169,900	$ 4,169,900	0.235	$ 979,719	$ 129,969,259
TOTALS		**$ 19,460,000**	**$ 208,495,000**	**$ 227,955,000**		**$ 129,969,259**	

SYNERGY ENVIRONMENTAL, LLC

TABLE 6. SUMMARY OF COMPARISON CRITERIA FOR GROUNDWATER ALTERNATIVE REMEDIES

	CRITERIA	REFERENCE REMEDY	LESS AGGRESSIVE	MORE AGGRESSIVE	MOST AGGRESSIVE
THRESHOLD REQUIREMENTS	Achievement of Remedial Objectives	• Water treatment and blending approach provides protection of water supplies for all beneficial uses • Soil remediation at source areas addresses loss/impairment of land use	• Water treatment and blending approach provides protection of water supplies for all beneficial uses • Soil remediation at source areas addresses loss/impairment of land use	• Water treatment and blending approach provides protection of water supplies for all beneficial uses • Soil remediation at source areas addresses loss/impairment of land use	• Water treatment fully provides protection of water supplies for all beneficial uses • Soil remediation at source areas addresses loss/impairment of land use
	Consistency with General Land Use	• Source control activities at individual facilities are outside the scope of FS • ADEQ to assure facility work meets general land use plans	• Source control activities at individual facilities are outside the scope of FS • ADEQ to assure facility work meets general land use plans	• Source control activities at individual facilities are outside the scope of FS • ADEQ to assure facility work meets general land use plans	• Source control activities at individual facilities are outside the scope of FS • ADEQ to assure facility work meets general land use plans
	Consistency with Water Management Plans	• Adequately addresses RID needs • Protects water quality, quantity, and reliability of affected water supply	• Adequately addresses RID needs • Protects water quality, quantity, and reliability of affected water supply	• Adequately addresses RID needs • Protects water quality, quantity, and reliability of affected water supply	• Fully addresses RID needs • Assures water quality, quantity, and reliability of affected water supply
COMPARISON CRITERIA	Practicability	• Moderate implementation issues • Requires treatment at 5 additional RID well sites • Requires drilling of 2 replacement wells	• Comparatively easy to implement • Requires treatment at 2 additional RID well sites • Requires drilling of 1 replacement well	• Moderate implementation issues • Requires treatment at 2 additional RID well sites • Requires drilling of 1 replacement well • Requires reconfiguring 5 wells for injection	• Comparatively more difficult to implement • Requires treatment at 9 additional RID well sites • Requires drilling of 2 replacement wells
	Risk	• Treatment reduces risk of imminent and substantial endangerment to public • Treatment addresses estimated 83% of VOC mass impacting RID well field	• Treatment reduces risk of imminent and substantial endangerment to public • Treatment addresses estimated 77% of VOC mass impacting RID well field	• Treatment reduces risk of imminent and substantial endangerment to public • Treatment addresses estimated 77% of VOC mass impacting RID well field	• Treatment reduces risk of imminent and substantial endangerment to public • Treatment addresses estimated 91% of VOC mass impacting RID well field
	Cost	$ 13.6 million - Capital Cost $ 3.0 million - Annual O&M Cost $ 92.0 million - 50-year NPV	$ 9.4 million - Capital Cost $ 2.0 million - Annual O&M Cost $ 63.8 million - 50-year NPV	$ 14.6 million - Capital Cost $ 2.2 million - Annual O&M Cost $ 72.7 million - 50-year NPV	$ 19.5 million - Capital Cost $ 4.2 million - Annual O&M Cost $ 130 million - 50-year NPV
	Benefit	• RID pumping physically contains regional plume; priority pumping enhances hydraulic capture • Treatment restores impacted wells and provides high degree of public protection against potential exposure to VOCs in air	• RID pumping physically contains regional plume; priority pumping enhances hydraulic capture • Treatment restores impacted wells and provides high degree of public protection against potential exposure to VOCs in air	• RID pumping physically contains regional plume; priority pumping and injection enhances hydraulic capture • Treatment restores impacted wells and provides high degree of public protection against potential exposure to VOCs in air	• RID pumping physically contains regional plume; priority pumping enhances hydraulic capture • Treatment restores impacted wells and provides high degree of public protection against potential exposure to VOCs in air

TABLE 7. GROUNDWATER REMEDIAL ACTIONS - COMPARATIVE ANALYSIS

West Van Buren Area WQARF Site

Site	Treatment Technology	Required Treatment Levels[1]	End Use of Remediated Water	Remedy Capital Cost (in years completed)	Remedy Capital Cost (2014 dollars)[2]	Design Treatment Capacity	Normalized[3] Capital Costs/ Treatment Capacity ($/gpm)	Amount of Groundwater Extracted Through 2013	Amount of VOC Mass Removed Through 2013	Average Annual Groundwater Pump & Treat Rate	Annual VOC Mass Removal Rate	Annual Remedy O&M Costs	Routine O&M Cost ($/lb$_{VOC}$)	Routine O&M Cost ($/Kgal)
M52 CERCLA Site Operable Unit 1	Air Stripping with VGAC	Primary Drinking Water Standards	Industrial Sanitary Sewer Irrigation	$3.1 MM[b] (1992)	$5.3 MM	810 gpm[g]	$6,490	3.6 billion gallons[j]	23,635 pounds[j]	230 gpm[j] (2010-2013) 215 gpm[j]	813 pounds/year[j] (2010-2013) 899 pounds[j]	$1.3 MM/year[p] (2006-2010)	$1,210[p] $1,446	$6.37[p] (2006-2010) $11.50
M52 CERCLA Site Operable Unit 2	LGAC (lead/lag)	Primary Drinking Water Standards	Irrigation	$12.0 MM[c] (2001)	$16.2 MM	5,300 gpm[g]	$3,057	13.3 billion gallons[k]	14,116 pounds[k]	2.108 gpm[k] (2010-2013) 1,919 gpm[k]	612 pounds/year[k] (2010-2013); 401 pounds[k]	$1.1 MM/year[p] (2006-2010)	$794[p] $2,743	$0.84[p] (2006-2010) $1.09
NIBW CERCLA Site Central Groundwater Treatment Facility	Air Stripping with VGAC	Primary Drinking Water Standards	Drinking Water	$10.4 MM[d] (1993-2000)	$16.2 MM	9,400 gpm[d]	$1,723	56.8 billion gallons[l]	51,129 pounds[l] (TCE only)	4,343 gpm[l] (2010-2013) 3,624 gpm[l]	TCE only 1,065 pounds/year[l] (2010-2013) 1,004 pounds[l]	$0.86 MM/year[q] (2005-2009)	$807 (2010-2013) $856	$0.37 (2010-2013) $0.45
NIBW CERCLA Site Miller Road Treatment Facility	Air Stripping with VGAC	Primary Drinking Water Standards	Drinking Water	$10.3 MM[d] (1995-97)	$15.3 MM	6,300 gpm[d]	$2,429	32.4 billion gallons[l]	7,937 pounds[l] (TCE only)	4,891 gpm[l] (2010-2013) 4,003 gpm[l]	TCE only 574 pounds/year[l] (2010-2013) 401 pounds[l]	$0.54 MM/year[q] (2005-2007) ~ $2.3 MM/year (2008)	$932 - 4,064 (2010-2013) $1,334 - 5,818	$0.21 - 0.91 (2010-2013) $0.25 - 1.11
TIAA CERCLA Site Tucson Airport Remediation Project	Air Stripping with VGAC	Primary Drinking Water Standards	Drinking Water	$8.7 MM[e] (1994)	$13.9 MM	6,200 gpm[h]	$2,242	38.1 billion gallons[m]	4,570 pounds[m] (TCE only through 2012)	3,274 gpm[m] (2010-2013) 2,511 gpm[m]	TCE only 161 pounds/year[m] (2010-2013) 107 pounds[m]	$0.85 MM/year[h] (before 1,4-dioxane treatment began)	$5,280 (2010-2013) $7,944	$0.49 (2010-2013) $0.64
WVBA Site Proposed Less Aggressive Alternative Remedy	LGAC (lead/lag)	Primary Drinking Water Standards	Irrigation Drinking Water[a]	~ $9.4 MM[f]	~ $9.4 MM	~13,300 gpm[f,i]	~ $707	----	----	~ 11,758 gpm[n]	~ 2,503 pounds/year[o]	~ $1.7 MM/year[f,r]	~ $670	~ $0.27
WVBA Site Proposed Reference Remedy	LGAC (lead/lag)	Primary Drinking Water Standards	Irrigation Drinking Water[a]	~ $13.6 MM[f]	~ $13.6 MM	~19,500 gpm[f,i]	~ $697	----	----	~ 16,071 gpm[n]	~ 2,820 pounds/year[o]	~ $2.5 MM/year[f,r]	~ $883	~ $0.29
WVBA Site Proposed More Aggressive Alternative Remedy	LGAC (lead/lag)	Primary Drinking Water Standards	Irrigation Drinking Water[a]	~ $14.6 MM[f]	~ $14.6 MM	~13,300 gpm[f,i]	~ $1,098	----	----	~ 12,142 gpm[n]	~ 2,569 pounds/year[o]	~ $1.8 MM/year[f,r]	~ $708	~ $0.28
WVBA Site Proposed Most Aggressive Alternative Remedy	LGAC (lead/lag)	Primary Drinking Water Standards	Irrigation Drinking Water[a]	~ $19.5 MM[f]	~ $19.5 MM	~29,100 gpm[f,i]	~ $670	----	----	~ 23,047 gpm[n]	~ 3,164 pounds/year[o]	~ $3.5 MM/year[f,r]	~ $1,120	~ $0.29

Notes:

1) Treatment Levels applicable to site Contaminants of Concern
2) Based on percentage increase in Consumer Price Index (CPI) from dates of construction completion through May 2014.
3) Capital Cost in 2014 dollars relative to design treatment capacity in gpm.

* Values in red denote 2013 reported values/metrics

SYNERGY ENVIRONMENTAL, LLC

TABLE 7. GROUNDWATER REMEDIAL ACTIONS - COMPARATIVE ANALYSIS

West Van Buren Area WQARF Site

Abbreviations:

M52 = Motorola 52nd Street Superfund Site
NIBW = North Indian Bend Wash
TIAA = Tucson International Airport Area
WVBA = West Van Buren Area
VGAC = vapor-phase GAC
LGAC = liquid-phase GAC
lb = pound
Kgal = thousand gallons
MM = million
gpm = gallons per minute
O&M = operation and maintenance
VOC = volatile organic compound
TCE = trichloroethene
~ = values are estimates
CERCLA = Comprehensive Environmental Response,

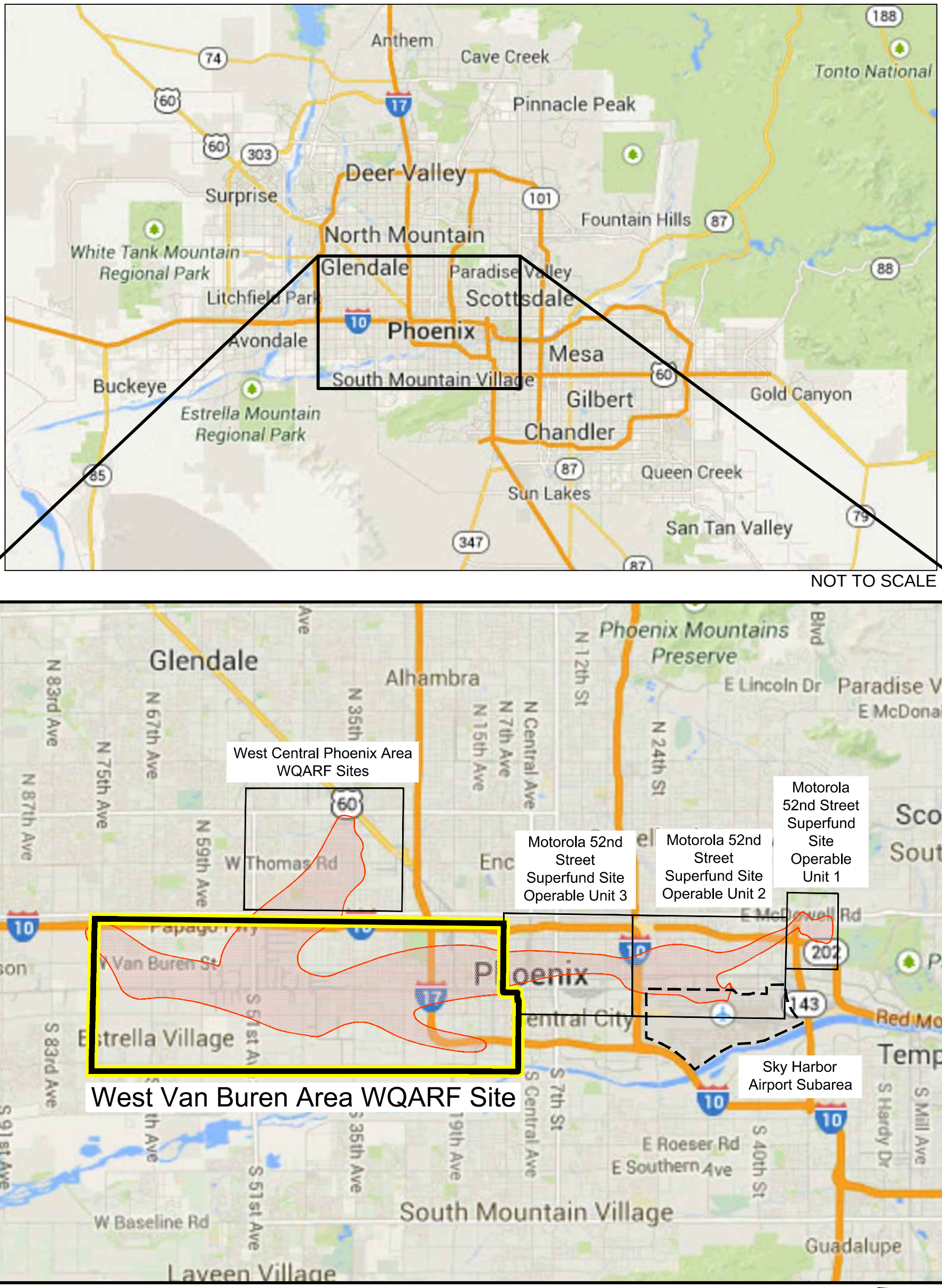
Explanation:

a) A major portion of remediated water is planned for municipal use pending RID construction of a separate conveyance pipeline from the WVBA Site to District land.
b) Letter of Determination for Motorola 52nd Street Facility, Phoenix, dated September 30, 1988.
c) Final Remedial Action Report for Motorola 52nd Street Superfund Site, Operable Unit 2 Area, Phoenix, Arizona, prepared by Black & Veatch Corporation, dated September 12, 2003.
d) Final Feasibility Study Addendum, North Indian Bend Wash Superfund Site, Scottsdale, Arizona, prepared by the NIBW Participating Companies, dated November 15, 2000 (*See* Table M5 in Appendix M, Volume 5).
e) Verbal communication: Mr. Jeff Biggs, Project Coordinator, Tucson Airport Remediation Project, Tucson Water.
f) f) *Draft Feasibility Study Report*, West Van Buren Area WQARF Site, Phoenix, Arizona, prepared by Synergy Environmental (*See* Table 5 for design treatment capacity and Table 7 for capital and O&M costs).
g) 2011 Sitewide Five-Year Review Report, Motorola 52nd Street Superfund Site, Phoenix, Arizona, prepared by URS Corporation, September 2011 (See Sections 4.1 and 4.2; Tables 4-1 and 4-2).
h) First Five-Year Report for Tucson International Airport Area Superfund Site, Pima County, Arizona, prepared by U.S. Environmental Protection Agency, September 2013 (*See* Section 4.2.1 for pounds of VOCs removed and volume of groundwater extraction over 216 month period, and Section 4.3.1 for O&M costs [2001]).
i) The proposed remedy provides remediation of up to 26,800 gpm water supply when including blending of other contaminated supply wells that would operate according to an approved remedial action plan.
j) Information pertaining to amount of groundwater treated and mass removed is from annual Operable Unit No. 1 Effectiveness Reports prepared by Clear Creek Associates.
k) Information pertaining to amount of groundwater treated and mass removed is from annual Effectiveness Reports for 20th Street Groundwater Treatment Facility, Operable Unit 2 Area prepared by Connestoga-Rovers & Associates.
l) Information pertaining toamount of groundwater treated and mass removed is from annual Site Monitoring Reports, NIBW Superfund Site prepared by the NIBW Participating Companies.
m) Information pertaining to amount of groundwater treated and mass removed is from annual Water Quality Reports prepared by Tucson Water.
n) Estimated pumping rate is based on assigned pumping of remedy wells developed for the FS Model (see Appendix F).
o) Based on reported 2013 concentrations of PCE, TCE, and 1,1-DCE and projected pumping in groundwater modeling scenarios (see Appendix F).
p) Motorola 52nd St. Superfund Site, Five-Year Review Completed Fact Sheet, prepared by Environmental Protection Agency and Arizona Department of Environmental Quality (*See* page 2 for average VOC mass removed and average volume of groundwater extracted for 2006-2010).
q) O&M Costs Summary).
r) Excluding line item costs for area-wide groundwater monitoring and capital equipment costs from Table 7 *Draft Feasibility Study Report*, West Van Buren Area WQARF Site, Phoenix, Arizona, prepared by Synergy Environmental.

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FIGURES

Drawing Path: N:\Swap\AcPublish_5820\, Drawing Name: Site Location Map Fig 01 Exhibit.dwg



0 2

Abbreviations

WQARF - Water Quality Assurance Revolving Fund
PCE - Tetrachloroethene
TCE - Trichloroethene
µg/L - Micrograms per liter

ARIZONA

EXPLANATION

Site Boundary

Estimated Extent of PCE and/or TCE Contamination greater than 5 µg/L in Central Phoenix Groundwater Contaminant Plume

N

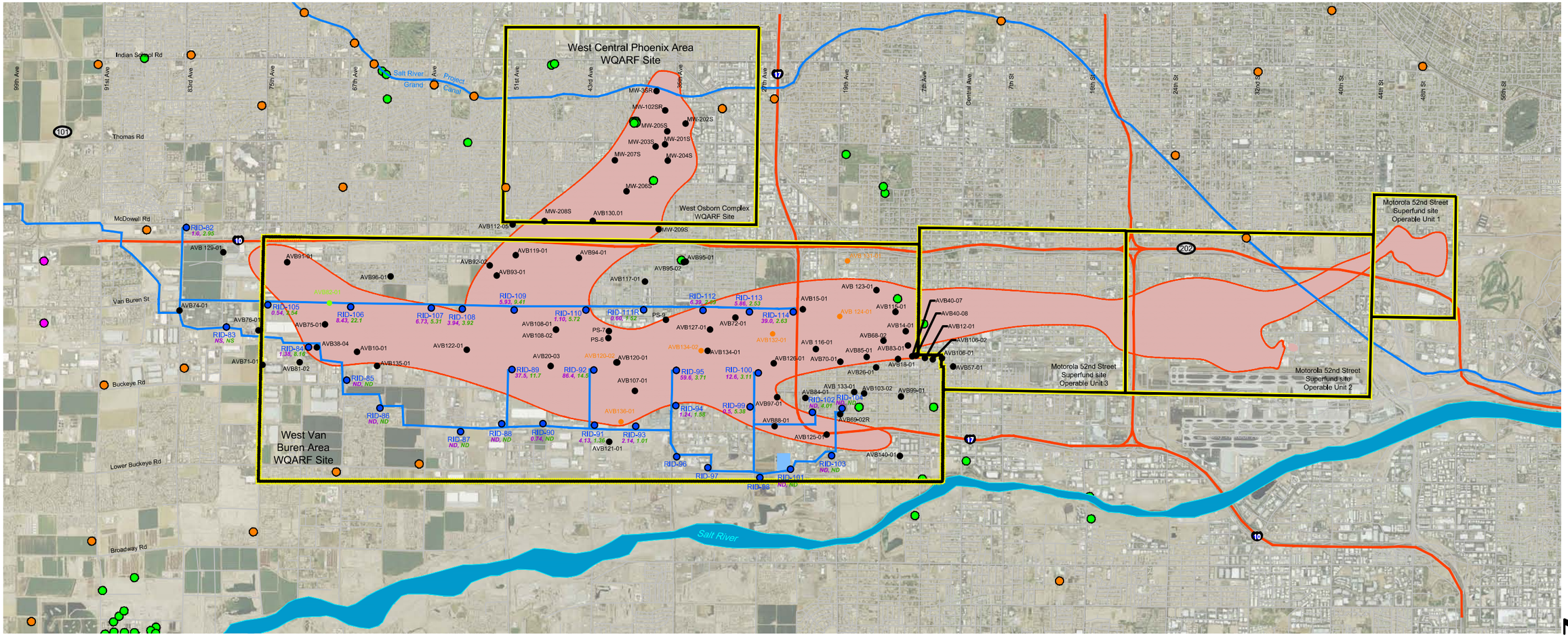
SITE LOCATION MAP

Roosevelt Irrigation District
West Van Buren Area
WQARF Site

By: LD	Date: 05/28/15	Project No. 805.01

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602-430-2785

Figure 1



EXPLANATION

- Roosevelt Irrigation District Well Identifier
- RID-89 / NS, NS — Concentration of PCE, in µg/L; Concentration of TCE, in µg/L
- AVB10-01 — Monitor Well and Identifier (Black=UAU1; Orange=UAU2; Green=MAU)
- City of Phoenix Well
- City of Tolleson Well
- Salt River Project Well
- Site Boundary
- Estimated Extent of PCE and/or TCE Contamination greater than 5µg/L in Central Phoenix Groundwater Contaminant Plume
- Existing Canal or Pipeline
- Interstates
- Local Streets

NOTE: Water quality data noted for RID wells are from September 2013. Water quality data reported for monitor well in the West Van Buren Area and West Osborn Complex WQARF site are from March 2013 and October 2013, respectively

Abbreviations

WQARF	- Water Quality Assurance Revolving Fund
WWTP	- Waste Water Treatment Plant
RID	- Roosevelt Irrigation District
LAU	- Lower Aquifer Unit
MAU	- Middle Aquifer Unit
UAU	- Upper Aquifer Unit
ND	- Not Detected
NS	- Not Sampled
ADEQ	- Arizona Department of Environmental Quality
PCE	- Tetrachloroethene
TCE	- Trichloroethene
µg/L	- Micrograms per Liter

0 6,600 13,200

APPROXIMATE SCALE IN FEET

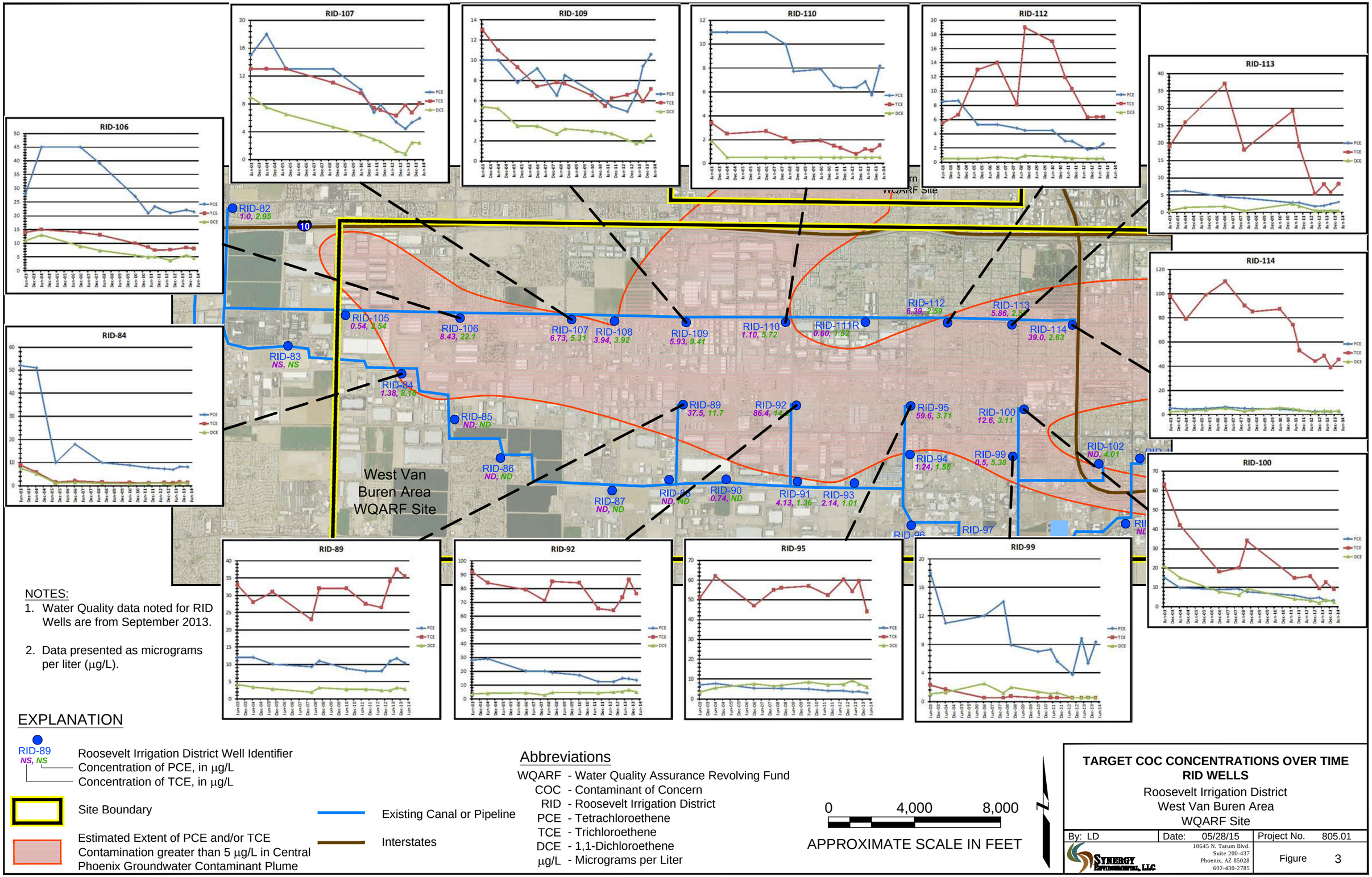
Groundwater contamination depicted on this map represents the author's interpretation of currently available data to estimate the geographical extent of PCE and TCE contamination in commingled contaminant plumes throughout the central and west central Phoenix area. There are numerous sources of contaminants of concern in groundwater throughout this region and interpolation of data and its representation in a consolidated regional plume is subjective; the actual extent of contamination may be different. Sources of data include depth specific UAU and MAU monitor wells and large capacity RID wells that produce groundwater largely from the UAU. The representation of the extent of groundwater contamination within the Motorola 52nd Street Superfund site is generated from the most recent plume map published by ADEQ and posted on their web site.

CENTRAL PHOENIX REGIONAL GROUNDWATER CONTAMINATION

Roosevelt Irrigation District
West Van Buren Area
WQARF Site

By: ld	Date: 05/28/15	Project No. 805.01
SYNERGY ENVIRONMENTAL, LLC		Figure 2

Plot Date: 05/28/15 - 2:29pm, Plotted by: Luke
Drawing Path: N:\Synergy\Projects\805.01 Feasibility Study\A. Drawing\Name: Figure 2 Exhibit.dwg



NOTES:

1. Water Quality data noted for RID Wells are from September 2013.
2. Data presented as micrograms per liter (µg/L).

EXPLANATION

RID-89
NS, NS

- Roosevelt Irrigation District Well Identifier
- Concentration of PCE, in µg/L
- Concentration of TCE, in µg/L

Site Boundary

Estimated Extent of PCE and/or TCE Contamination greater than 5 µg/L in Central Phoenix Groundwater Contaminant Plume

Existing Canal or Pipeline

Interstates

Abbreviations

WQARF - Water Quality Assurance Revolving Fund
COC - Contaminant of Concern
RID - Roosevelt Irrigation District
PCE - Tetrachloroethene
TCE - Trichloroethene
DCE - 1,1-Dichloroethene
µg/L - Micrograms per Liter

0 4,000 8,000

APPROXIMATE SCALE IN FEET

N

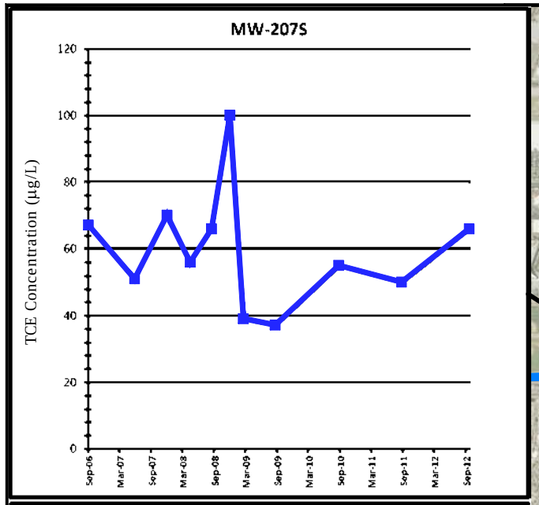
TARGET COC CONCENTRATIONS OVER TIME
RID WELLS
Roosevelt Irrigation District
West Van Buren Area
WQARF Site

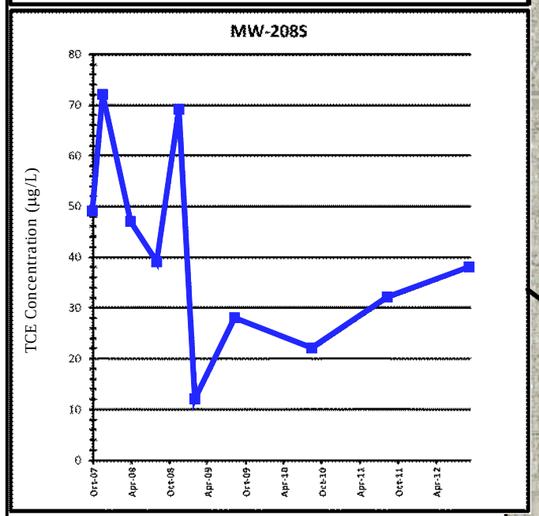
By: LD	Date: 05/28/15	Project No. 805.01

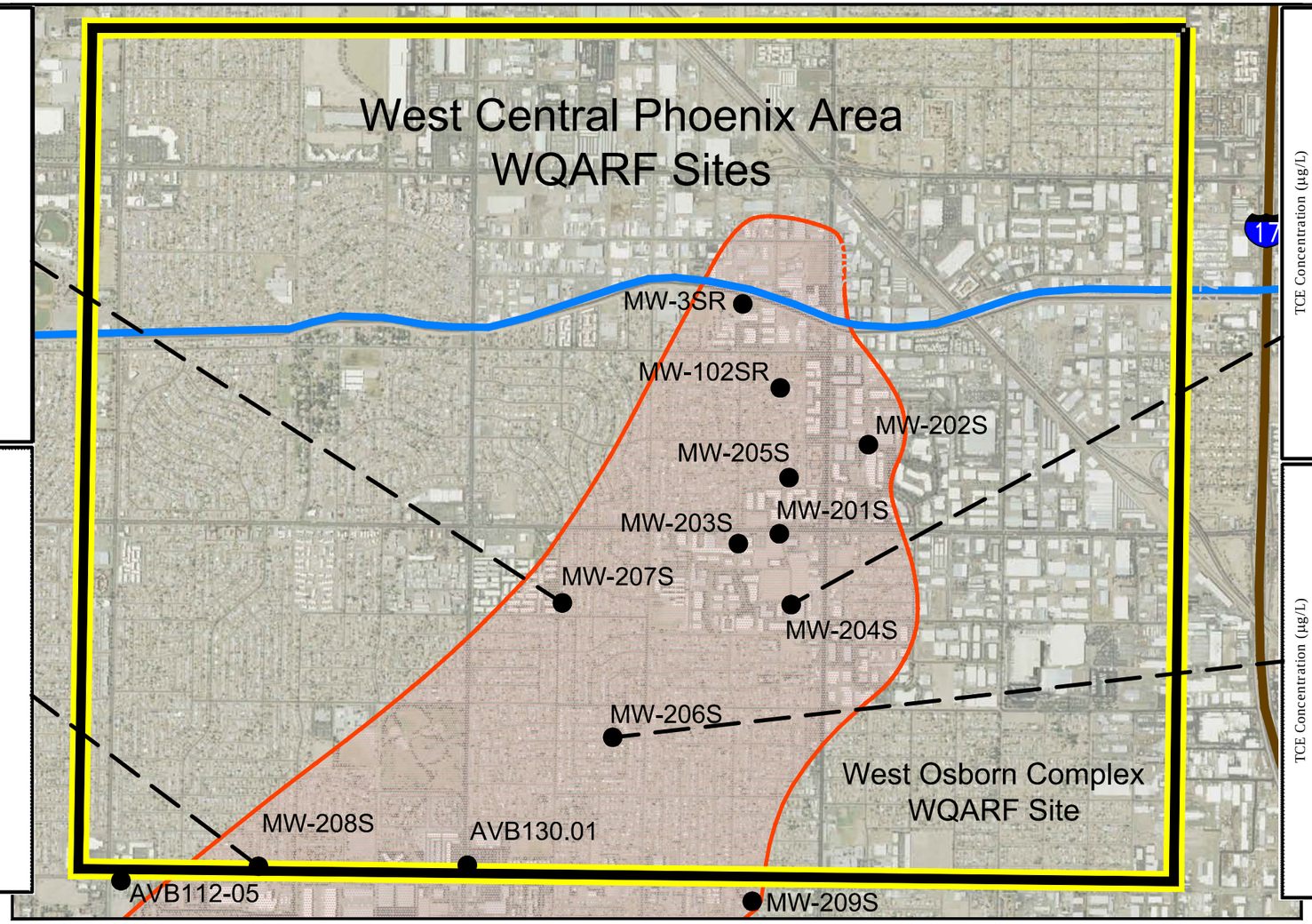
SYNERGY ENVIRONMENTAL, LLC
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602-430-2785

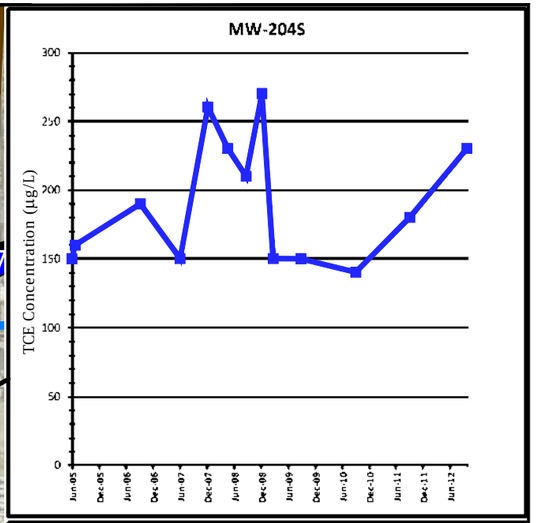
Figure 3

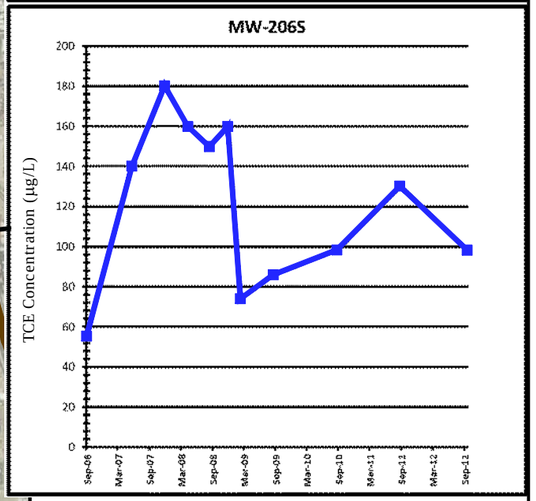
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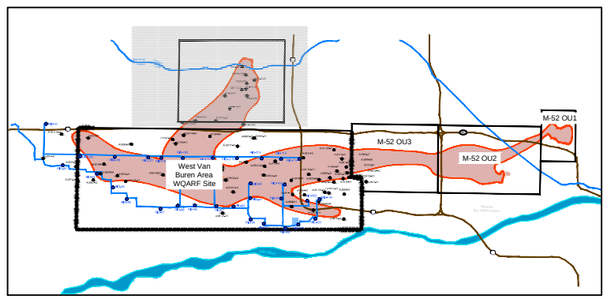












KEY MAP
NOT TO SCALE

Abbreviations

WQARF - Water Quality Assurance Revolving Fund
RID - Roosevelt Irrigation District
PCE - Tetrachloroethene
TCE - Trichloroethene
µg/L - Micrograms per liter

EXPLANATION

- Existing Canal or Pipeline
- Interstates
- MW-206S — Monitor Well Identifier
- Site Boundary - West Osborn Complex
- Estimated Extent of PCE and/or TCE Contamination greater than 5 µg/L in West Osborn Complex Vicinity Contaminant Plume

0 2,000 4,000
APPROXIMATE SCALE IN FEET

N

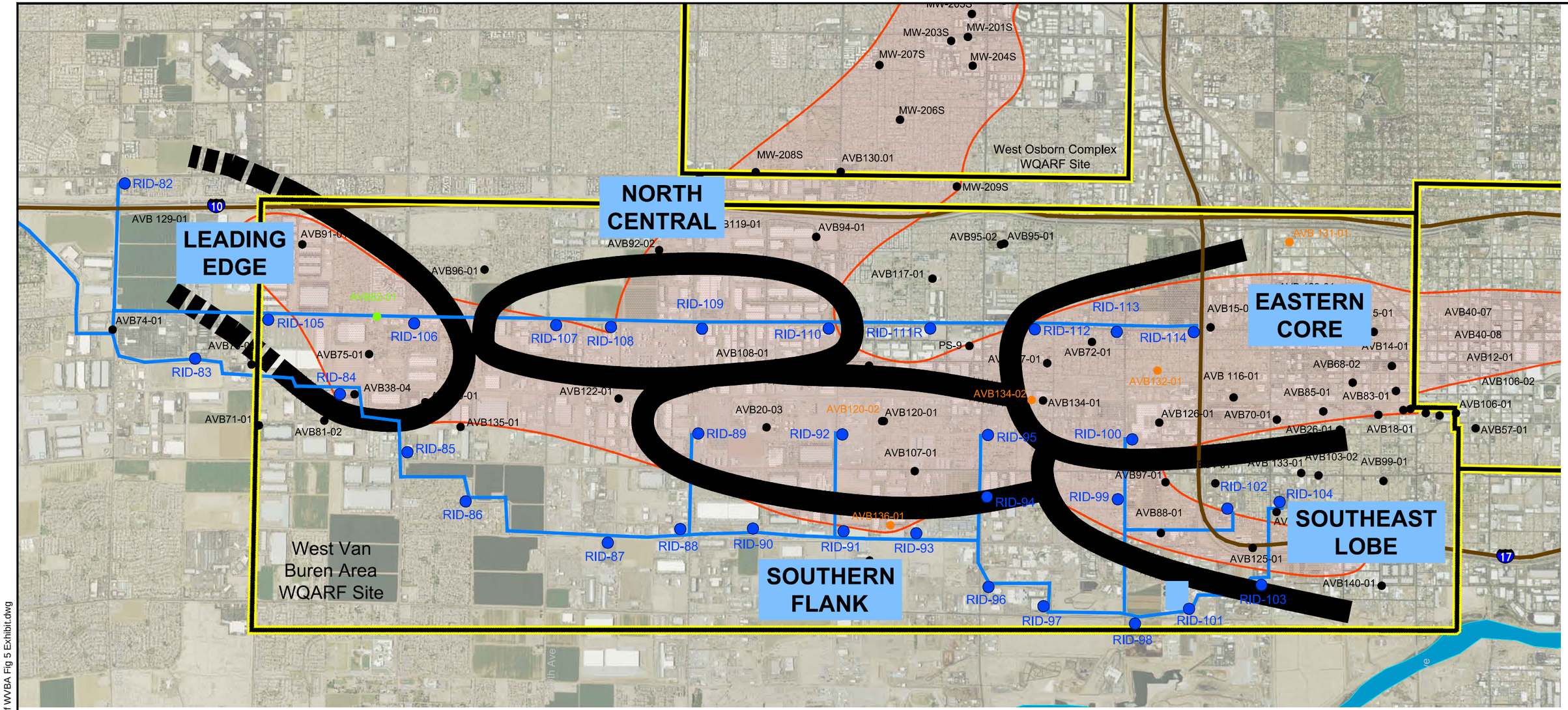
WEST OSBORN COMPLEX VICINITY SHALLOW GROUNDWATER SYSTEM PLUME

Roosevelt Irrigation District
West Van Buren Area
WQARF Site

By: LD	Date: 05/28/15	Project No. 805.01

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Figure 4



EXPLANATION

RID-89 — Roosevelt Irrigation District Well; Well Identifier

AVB10-01 — Monitor Well and Identifier (Black=UAU1; Orange=UAU2; Green=MAU)

Site Boundary

Estimated Extent of PCE and/or TCE Contamination greater than 5 µg/L in Central Phoenix Groundwater Contaminant Plume

Existing Canal or Pipeline

Interstates

Abbreviations

WQARF - Water Quality Assurance Revolving Fund
WVBA - West Van Buren Area
VOC - Volatile Organic Compound
RID - Roosevelt Irrigation District
LAU - Lower Aquifer Unit
MAU - Middle Aquifer Unit
UAU - Upper Aquifer Unit
PCE - Tetrachloroethene
TCE - Trichloroethene
µg/L - Micrograms per liter

N

0 3,600 7,200

APPROXIMATE SCALE IN FEET

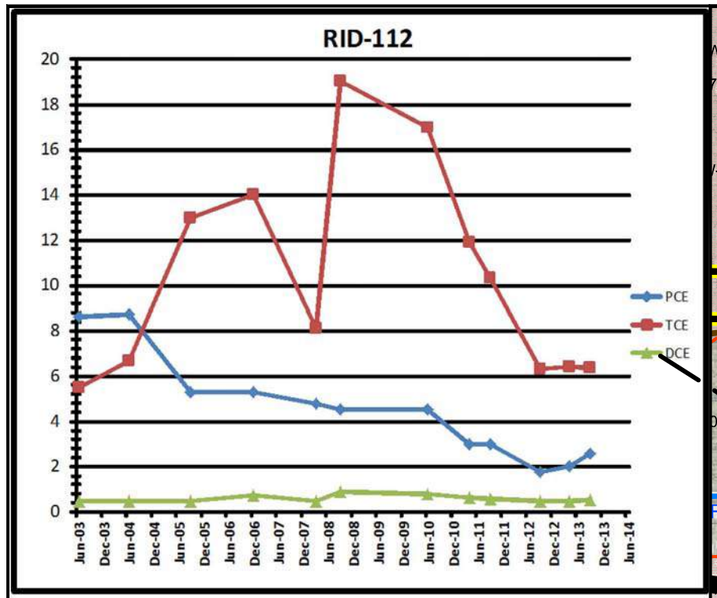
REGIONS OF WVBA CONTAMINANT PLUME BASED ON VOC TRENDS
Roosevelt Irrigation District
West Van Buren Area
WQARF Site

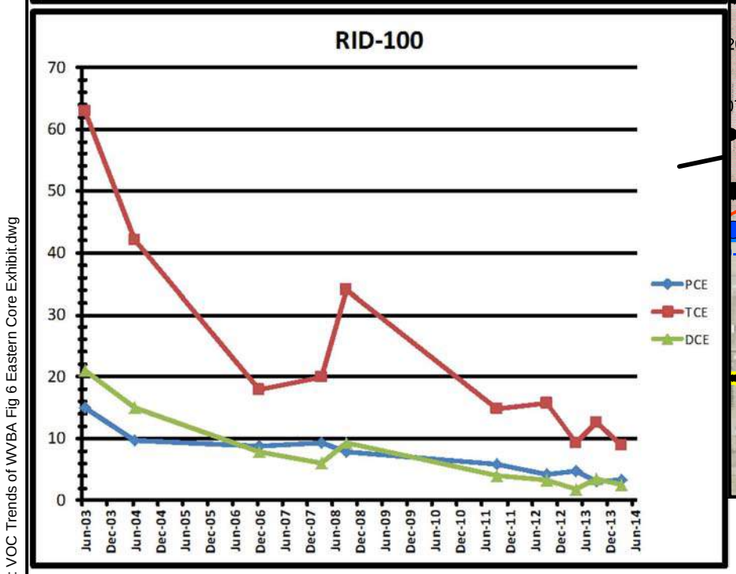
By: LD	Date: 05/28/15	Project No. 805.01

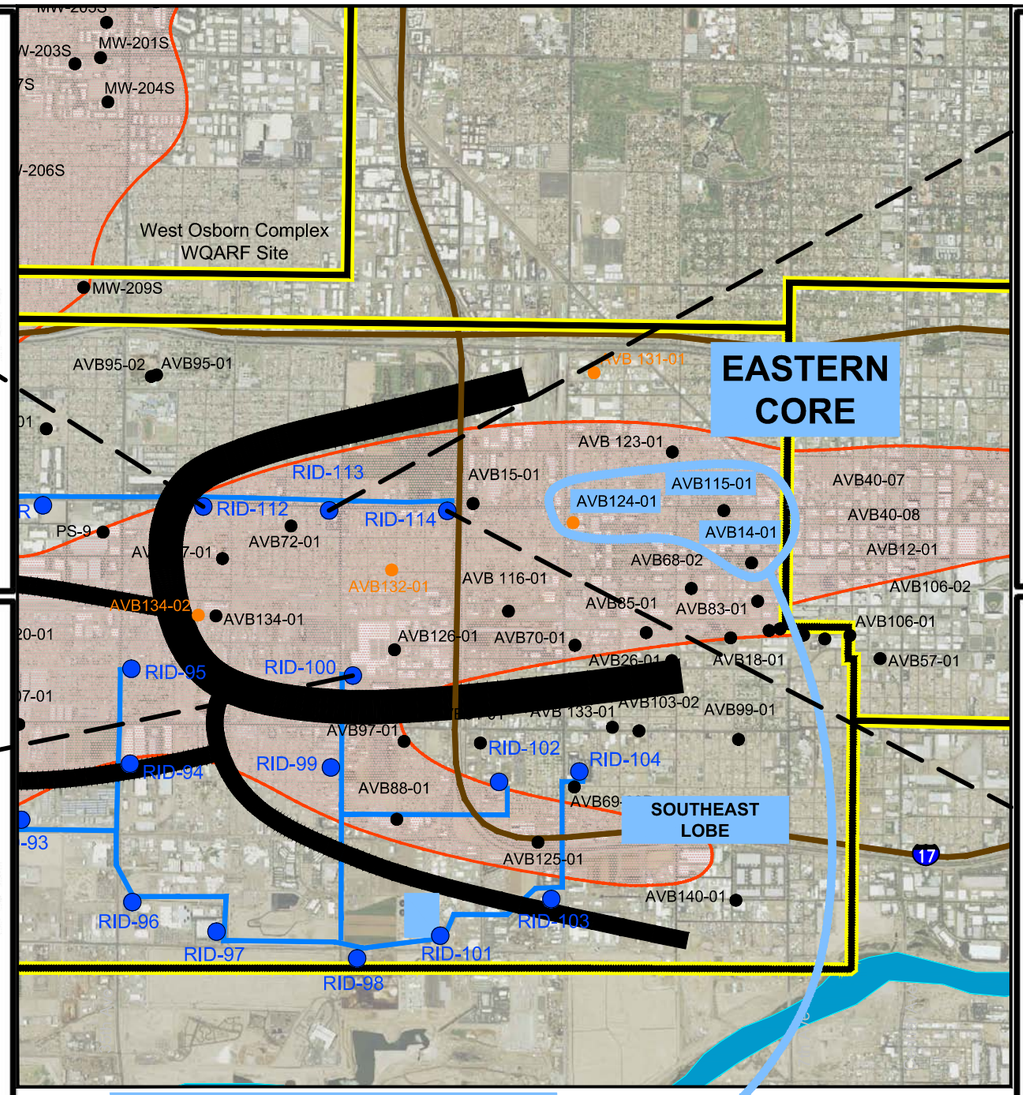
SYNERGY ENVIRONMENTAL, LLC
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Phoenix, AZ 85028
602-430-2785

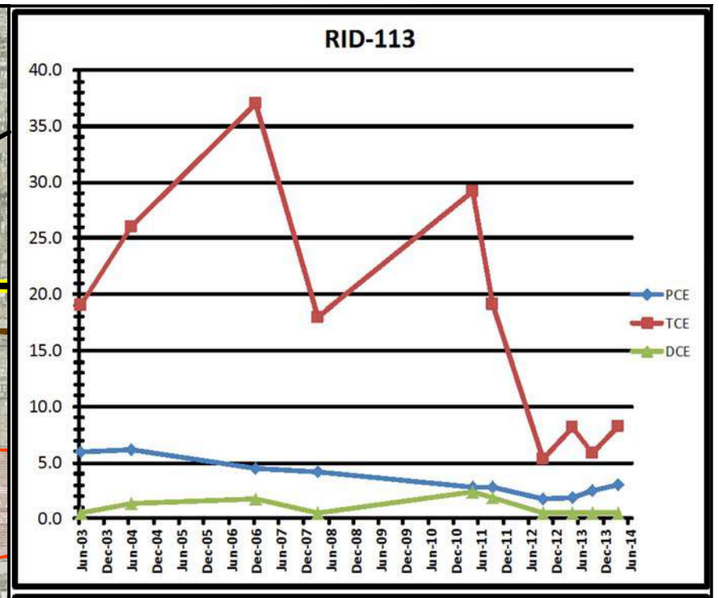
Figure 5

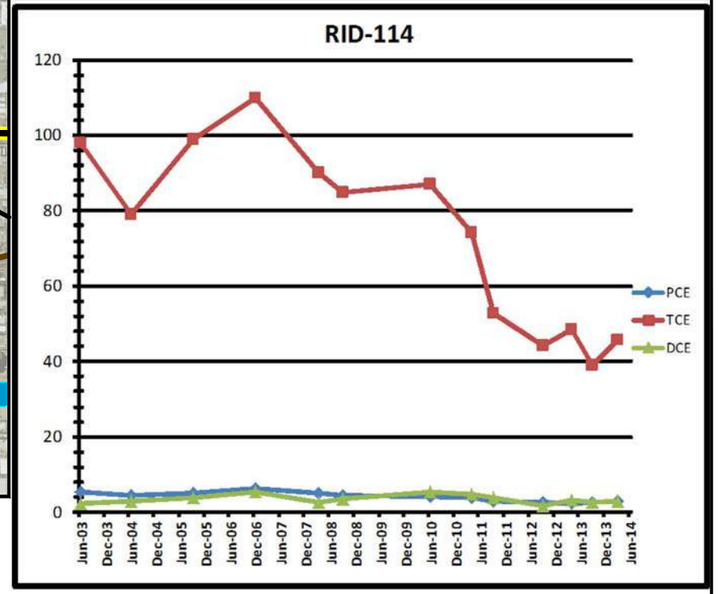
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TCE Concentrations - Select ADEQ Monitor Wells in Eastern Core:

	AVB14-01 (66-106 feet bls)	AVB115-01 (70-150 feet bls)	AVB124-01 (200-230 feet bls)
2003	**87**	**210**	**N/A**
2008	**48**	**120**	**100**
2013*	**4.4**	**40.8**	**100**
2014*	**4.3**	**40.9**	**127**

*Based on Sampling in 1st Quarter

EXPLANATION

- RID-89 — Roosevelt Irrigation District Well Identifier
- AVB10-01 — Monitor Well and Identifier (Black=UAU1; Orange=UAU2; Green=MAU)

NOTE:
1. Data presented as micrograms per liter (µg/L)

- Site Boundary
- Estimated Extent of PCE and/or TCE Contamination greater than 5 µg/L in Central Phoenix Groundwater Contaminant Plume
- Existing Canal or Pipeline
- Interstates

Abbreviations

WQARF - Water Quality Assurance Revolving Fund
WVBA - West Van Buren Area
VOC - Volatile Organic Compound
RID - Roosevelt Irrigation District
LAU - Lower Aquifer Unit
MAU - Middle Aquifer Unit
UAU - Upper Aquifer Unit
PCE - Tetrachloroethene
TCE - Trichloroethene
DCE - 1,1-Dichloroethene
µg/L - Micrograms per Liter
bls -Below Land Surface
N/A - Not Applicable

N

0 3,600 7,200

APPROXIMATE SCALE IN FEET

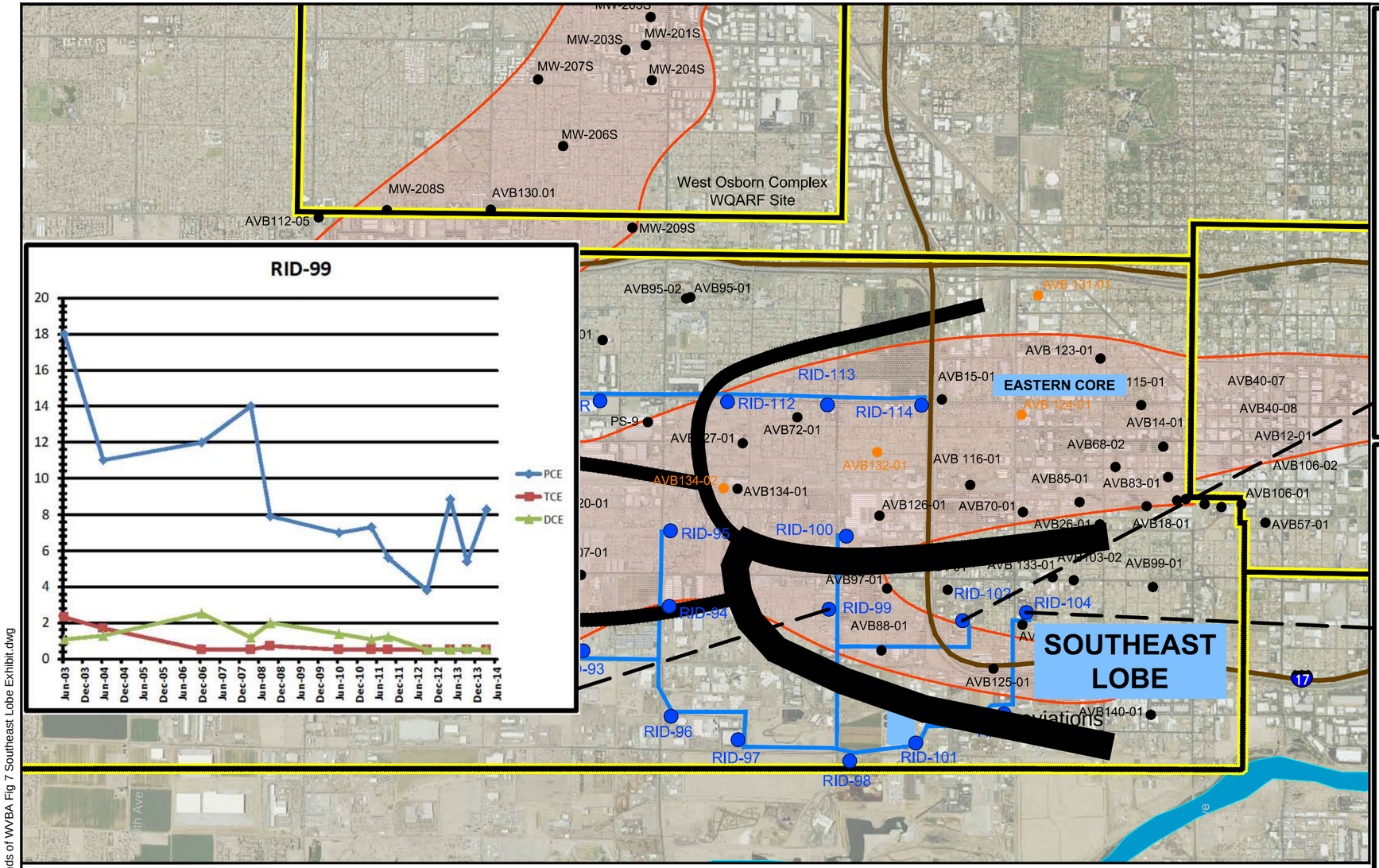
VOC TRENDS IN EASTERN CORE
OF WVBA CONTAMINANT PLUME
Roosevelt Irrigation District
West Van Buren Area
WQARF Site

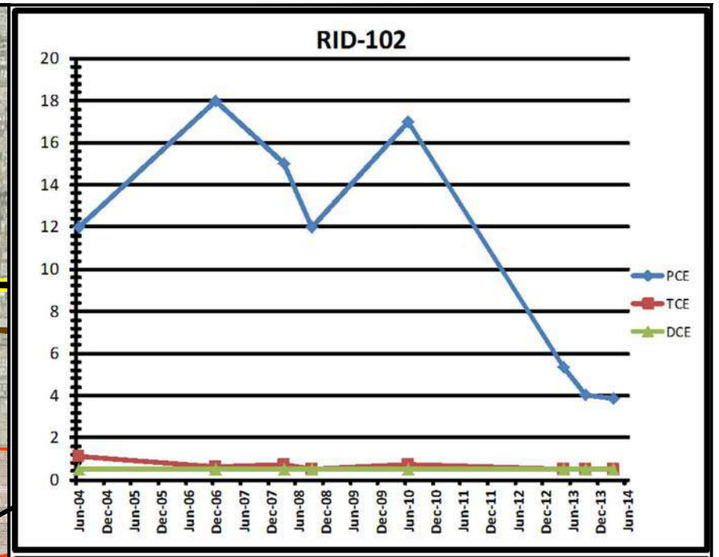
By: LD	Date: 05/28/15	Project No. 805.01

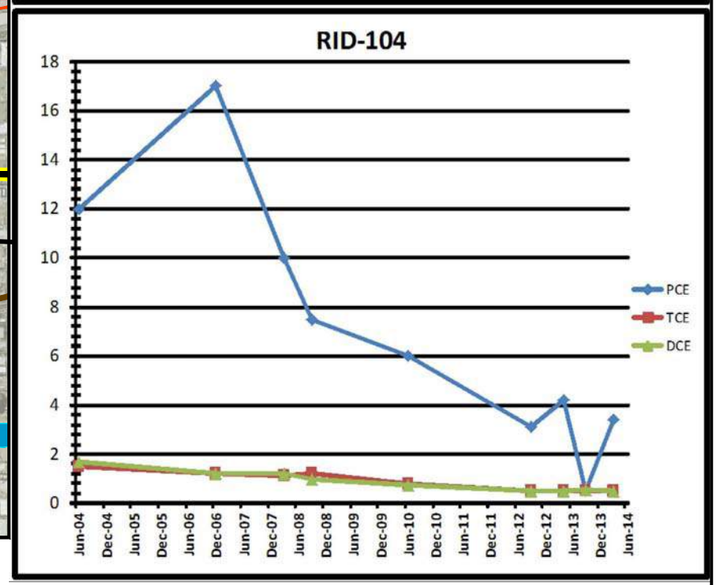
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Phoenix, AZ 85028
602-430-2785

Figure 6

Drawing Path: N:\Swap\AcPublish_5628\, Drawing Name: VOC Trends of WVBA Fig 6 Eastern Core Exhibit.dwg







EXPLANATION

- RID-89 — Roosevelt Irrigation District Well Identifier
- AVB10-01 — Monitor Well and Identifier (Black=UAU1; Orange=UAU2; Green=MAU)
- Site Boundary
- Estimated Extent of PCE and/or TCE Contamination greater than 5 µg/L in Central Phoenix Groundwater Contaminant Plume
- Existing Canal or Pipeline
- Interstates

NOTE:
1. Data presented as micrograms per liter (µg/L)

Abbreviations

WQARF	- Water Quality Assurance Revolving Fund
WVBA	- West Van Buren Area
VOC	- Volatile Organic Compound
RID	- Roosevelt Irrigation District
LAU	- Lower Aquifer Unit
MAU	- Middle Aquifer Unit
UAU	- Upper Aquifer Unit
PCE	- Tetrachloroethene
TCE	- Trichloroethene
DCE	- 1,1-Dichloroethene
µg/L	- Micrograms per Liter

0 3,600 7,200

APPROXIMATE SCALE IN FEET

VOC TRENDS IN SOUTHEAST LOBE OF WVBA CONTAMINANT PLUME

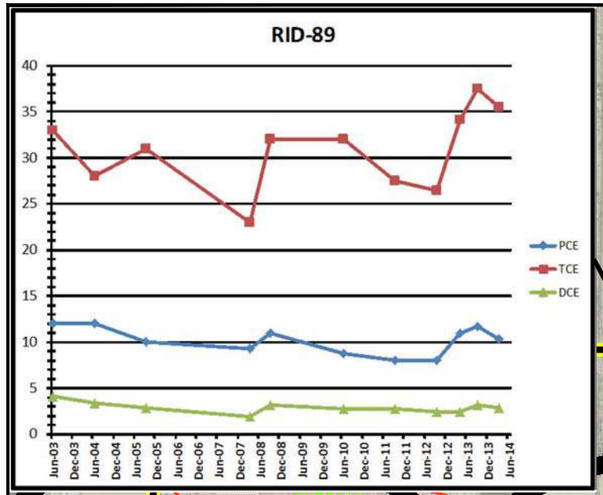
Roosevelt Irrigation District
West Van Buren Area
WQARF Site

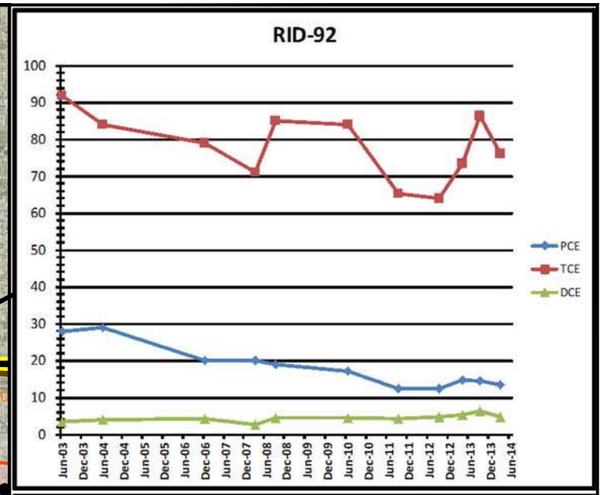
By: LD	Date: 05/28/15	Project No. 805.01

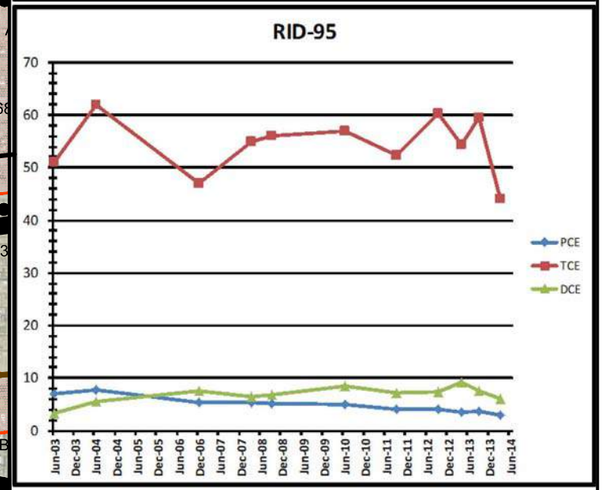
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Phoenix, AZ 85028
602-430-2785

Figure 7

Drawing Path: N:\Swap\AcPublish_5820\, Drawing Name: VOC Trends of WVBA Fig 7 Southeast Lobe Exhibit.dwg







MW-205S
MW-202S
MW-203S
MW-201S
MW-207S
MW-204S
MW-206S
MW-208S
AVB130.01
West Osborn Complex
WQARF Site
AVB112-05
MW-209S
AVB119-01
AVB94-01
AVB92-02
AVB95-02
AVB95-01
AVB117-01
AVB 123-01
NORTH CENTRAL
RID-109
RID-105
RID-106
RID-107
RID-108
RID-110
RID-111R
RID-113
RID-112
RID-114
AVB15-01
AVB 124-01
AVB76-01
AVB75-01
AVB108-01
PS-9
AVB72-01
EASTERN CORE
AVB132-01
AVB 116-01
RID-83
RID-84
AVB38-04
AVB122-01
AVB134-01
AVB85-01
AVB71-01
AVB81-02
AVB135-01
AVB20-03
AVB120-02
AVB120-01
AVB126-01
AVB70-01
AVB26-01
RID-89
RID-92
RID-95
RID-100
RID-85
AVB107-01
AVB384-01
AVB 133-01
AVB103
AVB97-01
RID-102
RID-104
RID-99
AVB88-01
AVB69-02R
SOUTHERN FLANK
SOUTHEAST LOBE
RID-86
RID-87
RID-88
RID-90
RID-91
RID-93
AVB121-01
AVB125-01
West Van Buren Area WQARF Site
RID-96
RID-97
RID-101

TCE Concentrations:

	RID-90	RID-91	RID-93
Sep-11	**N/S**	**1.07**	**1.02**
Sep-12	**N/S**	**2.63**	**1.85**
Apr-13	**0.5**	**2.99**	**1.17**
Sep-13	**0.74**	**4.13**	**2.14**
Mar-14	**0.63**	**1.11**	**1.05**

NOTE:
1. Data presented as micrograms per liter (µg/L)

EXPLANATION

RID-89 — Roosevelt Irrigation District Well Identifier

AVB10-01 — Monitor Well and Identifier (Black=UAU1; Orange=UAU2; Green=MAU)

Site Boundary

Estimated Extent of PCE and/or TCE Contamination greater than 5 µg/L in Central Phoenix Groundwater Contaminant Plume

Existing Canal or Pipeline

Interstates

Abbreviations

WQARF - Water Quality Assurance Revolving Fund
WVBA - West Van Buren Area
VOC - Volatile Organic Compound
RID - Roosevelt Irrigation District
LAU - Lower Aquifer Unit
MAU - Middle Aquifer Unit
UAU - Upper Aquifer Unit
PCE - Tetrachloroethene
TCE - Trichloroethene
DCE - 1,1-Dichloroethene
µg/L - Micrograms per Liter
N/S - Not Sampled

N

0 3,600 7,200

APPROXIMATE SCALE IN FEET

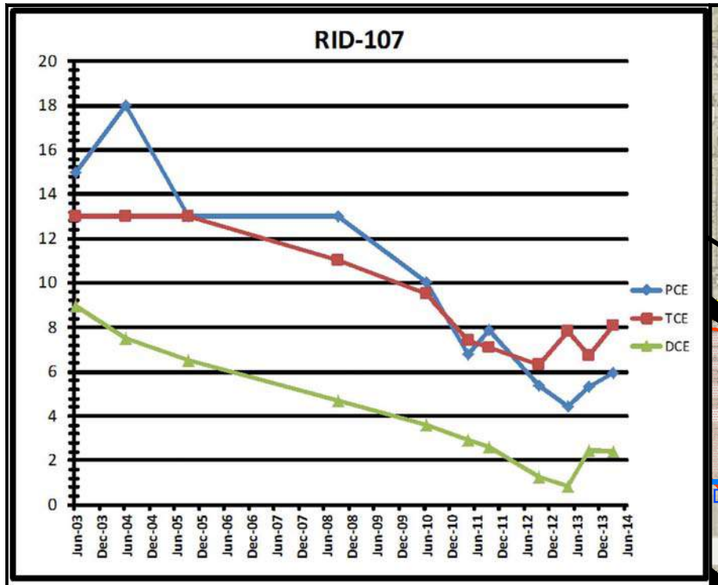
VOC TRENDS IN SOUTHERN FLANK OF WVBA CONTAMINANT PLUME
Roosevelt Irrigation District
West Van Buren Area
WQARF Site

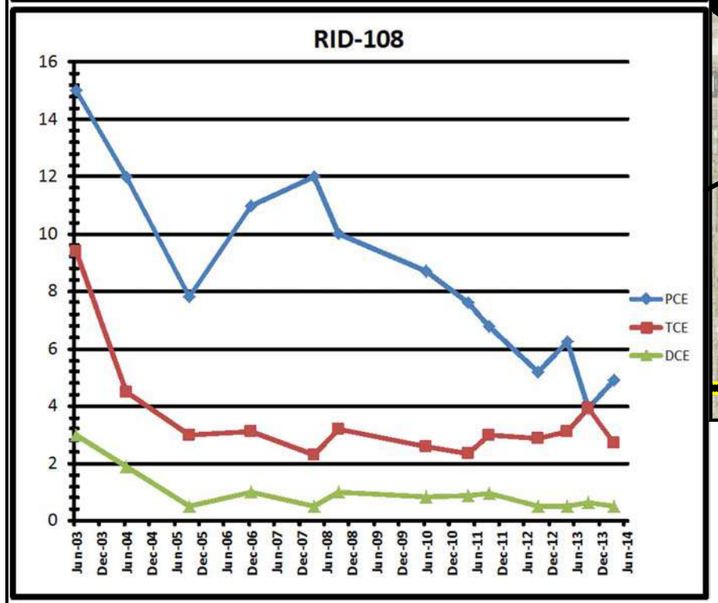
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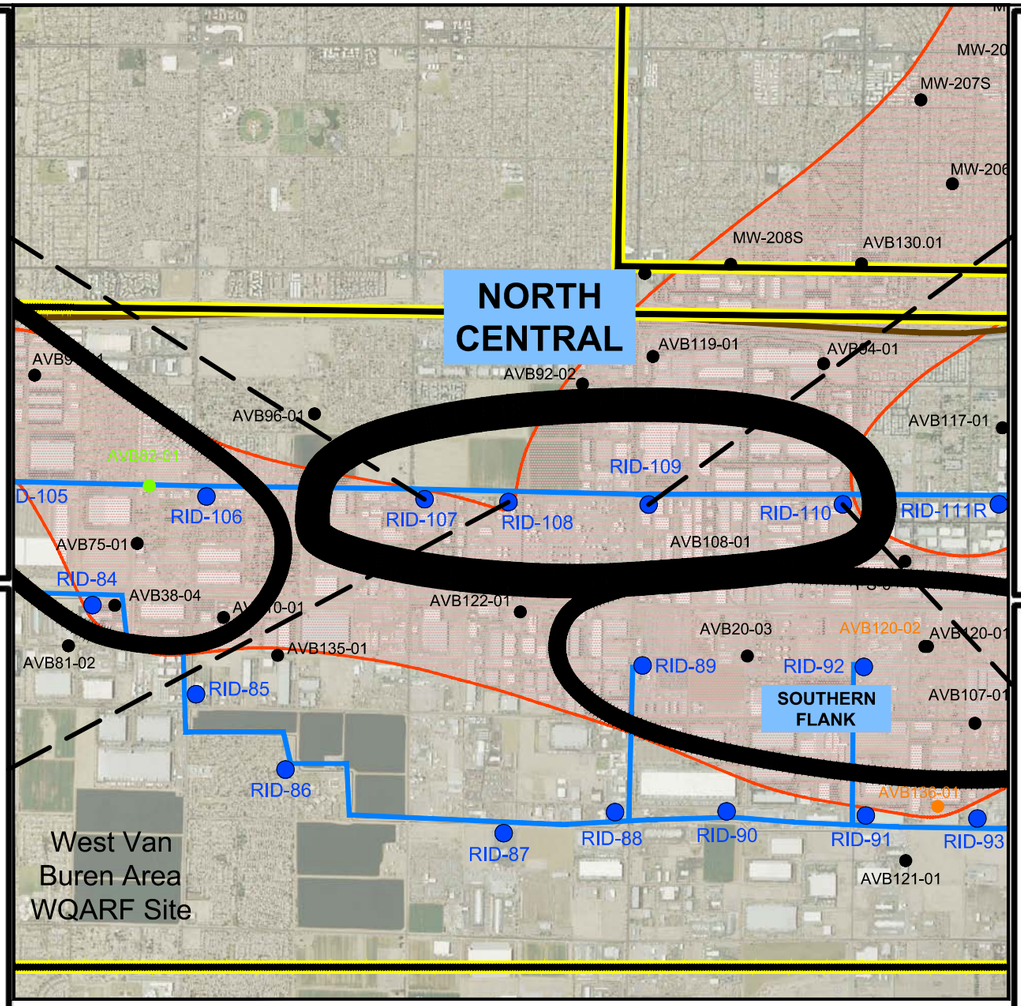
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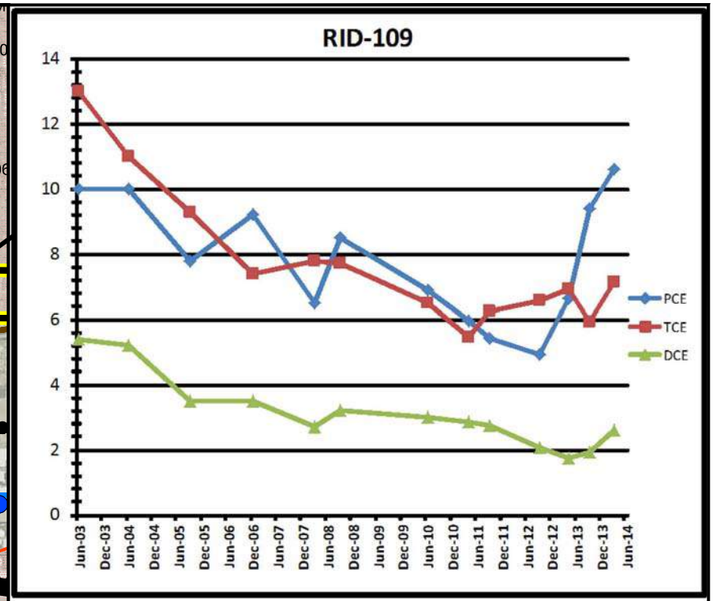
Figure 8

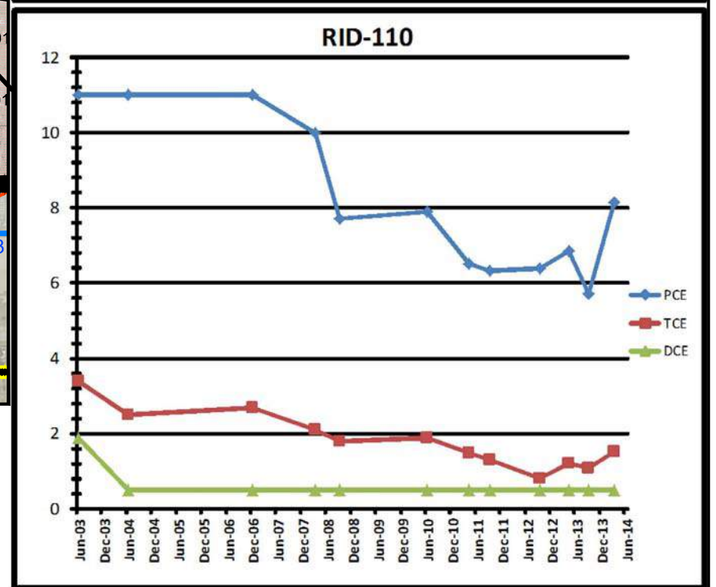
Drawing Path: N:\Swap\AcPublish_2208\, Drawing Name: VOC Trends of WVBA Fig 8 Southern Flank Exhibit.dwg











NOTE:
1. Data presented as micrograms per liter (µg/L)

EXPLANATION

- RID-89 — Roosevelt Irrigation District Well Identifier
- AVB10-01 — Monitor Well and Identifier (Black=UAU1; Orange=UAU2; Green=MAU)
- Site Boundary
- Estimated Extent of PCE and/or TCE Contamination greater than 5 µg/L in Central Phoenix Groundwater Contaminant Plume
- Existing Canal or Pipeline
- Interstates

Abbreviations

WQARF - Water Quality Assurance Revolving Fund
WVBA - West Van Buren Area
VOC - Volatile Organic Compound
RID - Roosevelt Irrigation District
LAU - Lower Aquifer Unit
MAU - Middle Aquifer Unit
UAU - Upper Aquifer Unit
PCE - Tetrachloroethene
TCE - Trichloroethene
DCE - 1,1-Dichloroethene
µg/L - Micrograms per Liter

N

0 3,600 7,200

APPROXIMATE SCALE IN FEET

VOC TRENDS IN NORTH CENTRAL PORTION OF WVBA CONTAMINANT PLUME

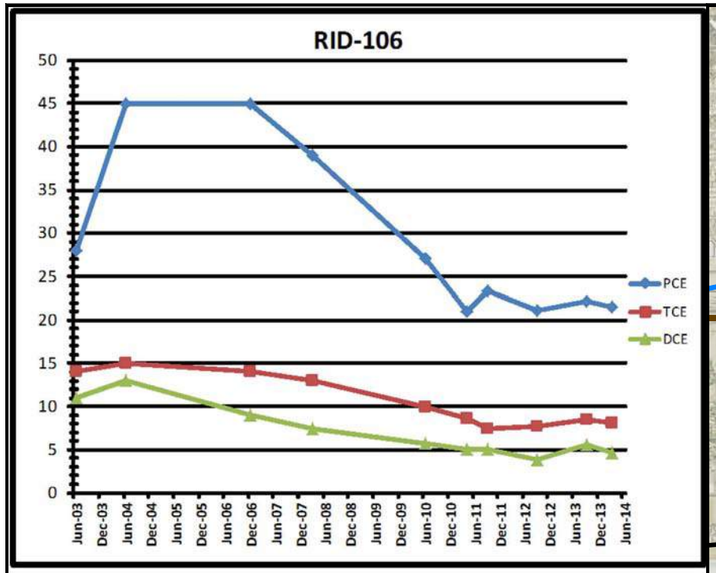
Roosevelt Irrigation District
West Van Buren Area
WQARF Site

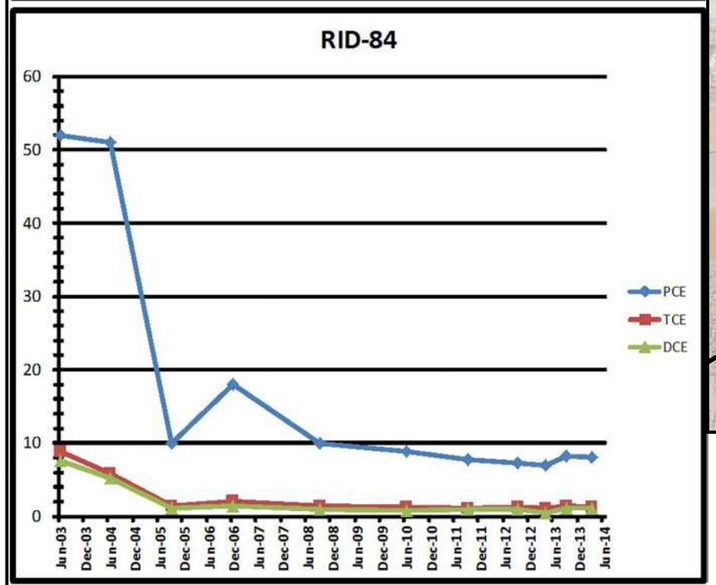
By: LD	Date: 05/28/15	Project No. 805.01

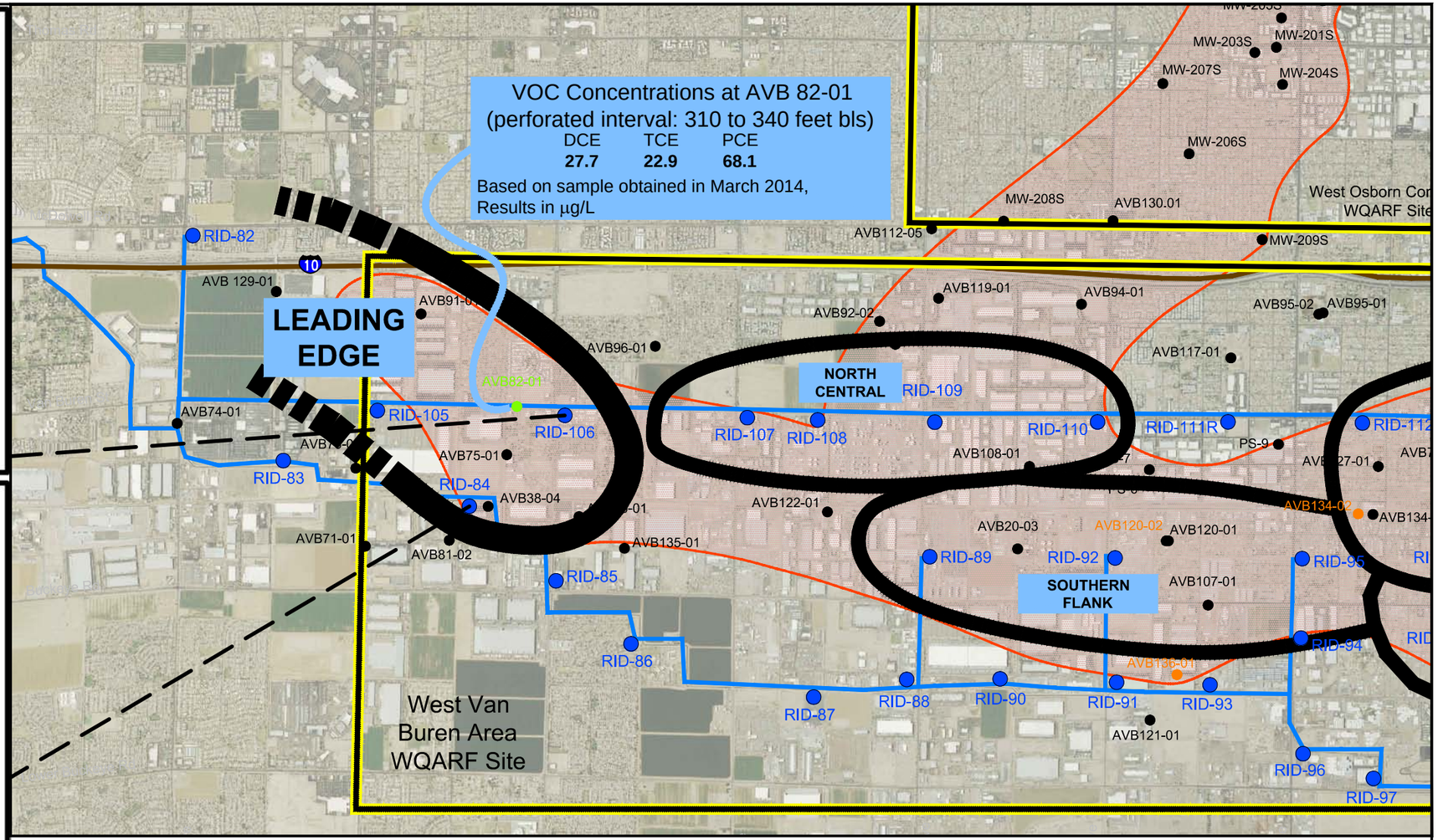
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602-430-2785

Figure 9

Drawing Path: N:\Swap\AcPublish_5820\, Drawing Name: VOC Trends of WVBA Fig 9 North Central Exhibit.dwg







Abbreviations

WQARF - Water Quality Assurance Revolving Fund
WVBA - West Van Buren Area
VOC - Volatile Organic Compound
RID - Roosevelt Irrigation District
LAU - Lower Aquifer Unit
MAU - Middle Aquifer Unit
UAU - Upper Aquifer Unit
PCE - Tetrachloroethene
TCE - Trichloroethene
DCE - 1,1-Dichloroethene
µg/L - Micrograms per Liter

EXPLANATION

RID-89 — Roosevelt Irrigation District Well Identifier

AVB10-01 — Monitor Well and Identifier (Black=UAU1; Orange=UAU2; Green=MAU)

Site Boundary

Estimated Extent of PCE and/or TCE Contamination greater than 5 µg/L in Central Phoenix Groundwater Contaminant Plume

Existing Canal or Pipeline

Interstates

NOTE:
1. Data presented as micrograms per liter (µg/L)

0 3,600 7,200

APPROXIMATE SCALE IN FEET

N

VOC TRENDS IN LEADING EDGE OF WVBA CONTAMINANT PLUME
Roosevelt Irrigation District
West Van Buren Area
WQARF Site

By: LD	Date: 05/28/15	Project No. 805.01

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Figure 10

Drawing Path: N:\Synergy\Roosevelt Irr\July 2014 Feasibility Study\, Drawing Name: VOC Trends of WVBA Fig 10 Leading Edge Exhibit.dwg